MetaStock® Professional

For Windows

User's Manual
Version 11

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Getting Started

Welcome

When you need to make an investment decision, the last thing you want is to have your computer get in the way. Technology should help you reach a decision, not hinder you. This is why MetaStock Professional is based on visual investing.
Visual investing lets your eyes operate the software, freeing your mind to concentrate on more important matters— like your trades.

Visual investing is made possible through object orientation. Simply put, “object orientation” means that the commands for objects are contained within the objects themselves. Rather than having to search a maze of menus and toolbars, you access commands directly from the objects.

To use MetaStock Professional, you only need to know two commands:

Right-click on everything. The object will display a menu of its commands.

Drag and drop everything. The on-screen animation of line studies and the fluid manner in which you can move indicators, prices, and inner windows greatly simplify the interface while helping you see investment opportunities.

By mastering these two commands, you will be positioned to make better trades using MetaStock Professional’s extensive collection of analysis tools.

Thank you for choosing MetaStock Professional.

Installing MetaStock 11

Refer to the *Getting Started* manual packaged with your copy of MetaStock for directions on installing and activating MetaStock.

Two References for Getting Up to Speed Fast

The following references will help you get up to speed as fast as possible.

The *Getting Started* Manual

The MetaStock *Getting Started* manual is a quick and easy way to immediately begin using MetaStock. It provides clear, illustrated, step-by-step instructions for getting around MetaStock's visually-oriented interface.

The Quickstart Tutorials

The Quickstart Tutorials are on-screen tutorials of MetaStock. Choose **Help>** Quickstart Tutorials (see page 37).

Running MetaStock Professional

IMPORTANT: Before your charts can receive real-time updates, you must be certain that the software supplied by your data vendor is installed and operating correctly. For more information, see the *Getting Started* manual.

To run MetaStock Professional

MetaStock icon

1. Click the MetaStock Professional icon on your desktop.

Alternatively, you can

1. Click the Windows **Start** button, and
2. Select **Programs>** Equis International> MetaStock Professional.

Tip of the Day

Every time you run MetaStock you can see a tip to help you use MetaStock more productively. You can display the "Tip of the Day" dialog at any time by choosing Tip of the Day from the Help menu. You can control the tips with the **Options** button.

Getting Help

Equis is ready to help you with problems you may encounter or questions you may have with the operation of MetaStock. However, before picking up the phone, please consider using some of our other support alternatives. The first place to check when you have a question about the operation of MetaStock is in the user's manual (or help system). Additional information is also provided on our web site in the Customer Zone.

User's Manual

The manual can be a great help if you run into a challenge or question. We have tried to provide every answer you will need to operate your software in the pages of your manuals. For immediate answers to most of your questions, please consult the manuals. You can also view each manual as a PDF file. To do so from within MetaStock, select **Help>** Manuals. There are two options: Getting Started with MetaStock, which opens the *Getting Started* manual, and Mastering MetaStock, which opens *Mastering MetaStock*.

Online Help

Help button

Every dialog in MetaStock contains a **Help** button. Click the button and a detailed help screen about the dialog or feature will display. In fact, almost all the information contained in the manual is just a mouse click away. Many of the help screens provide step-by-step examples of how to accomplish a task. MetaStock's help system can also be accessed by pressing F1. For more information on the help system, "Using MetaStock's Help System" on page 37.

Equis Web Site

You may also want to check out our web site on the Internet at http://www.equis.com. Not only do we offer information about our products, we also offer valuable free services and information.

Equis User Groups

Equis has users all over the world. In many of these areas, user groups have formed. Contact Equis to find out if there is an Equis user group in your area. Not only is this a great way to meet people with similar interests, but these clubs also offer a wealth of information and help not available elsewhere.

Windows-related Problems

If the problem is related to the Windows operating environment, please contact Microsoft technical support at the following URLs:

US/ Canada	http://support.microsoft.com/
Worldwide	http://support.microsoft.com/common/international.aspx

Technical Support Contact Information

The first time you call technical support you will be given a customer number. Please write it here for future reference.

Customer # _____

IMPORTANT: If you purchased MetaStock directly from a MetaStock Reseller, they will provide your first line of support. Please contact them for assistance.

When you contact Equis Support, please be prepared to provide your customer number or name and address to enable us to locate your account information.

Note: When you call technical support, it is useful if you can provide your version number and build date.
This information is displayed by selecting **Help>** About MetaStock or **Help>** About The DownLoader.

Our Support Team strives to respond to written responses (such as emails and faxes) within the first business day we receive them. Support queries are addressed during the support hours listed at http://www.equis.com/Customer/.

Please note that if you post a request outside of the listed support hours, we will address your request on the following business day in the order that it was received. On occasion it may take longer to receive a response, as the volume of requests fluctuates.

IMPORTANT: Due to the inherent complexity in the design and creation of custom indicators, trading systems, explorations, and experts, Equis cannot provide support over the phone for these items. However, support is available through email.
The file `Formula Help.doc` located in the MetaStock folder (usually `C:\Program Files\Equis\MetaStock`) on your hard drive— is a sample request form you can use when requesting this service. Complete the form in detail and email it to formulas@equis.com or submit a request from the Equis web site. (Look under **Customer Zone>** Trading Resources> Custom Formula Collection. This service is usually free, but we reserve the right to charge a fee for extensive development.

MetaStock Support

Phone	+1 (801) 265-9998
Fax	+1 (801) 265-2114
Email	*support@equis.com*
Service Request	Service Requests can be made directly from within MetaStock by selecting **Help>** Submit Service Request; you can also access the same resource through the Customer Zone area of www.equis.com.
Mail	Equis International Technical Support Dept. 90 South 400 West Suite 620 Salt Lake City, UT 84101
Online Chat	You can communicate directly with a support representative from within MetaStock by choosing **Help>** Request Online Assistance.

QuoteCenter Data Feed Support

In order to provide better service, the following telephone number and email address will only provide support for the QuoteCenter Data Feed; support for MetaStock will not be provided. MetaStock questions must be directed to the MetaStock Product Support as described above.

Phone:	+1 (801) 270-3290
Email:	msqcsupport@equis.com

Reuters DataLink Support

In order to provide better service, the following telephone numbers and email address will only provide support for Reuters DataLink; support for MetaStock will not be provided. MetaStock questions must be directed to the MetaStock Product Support channels as described above.

Phone:	+1 (800) 842-3045 (Sales and Billing Questions) +1 (801) 270-3298 (Support Questions)
Email:	support@reutersdatalink.com

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New Features and Changes

MetaStock Professional 11 has many new features, including:

- **MetaStock Fundamental Analyzer*.**

  Fundamental Tab – View at a glance the: Exchange, Industry, Sector, Market Cap, Avg. 21-Day Volume, 52-Week High and Low and more.

  Revenue Tab – Divided into two sections, this tab shows Quarterly and Annual Net Income Compared to Revenue including: Revenue, Net Income, and Percent fields for the last 8 quarters or 4 years.

  Performance Tab – Annual earnings per share, Annual Dividends, Annual Growth Rate and Percent Changes to S&P 500 over a variety of periods.

  Estimates Tab – EPS Quarterly Estimates and Total Revenue**.** Quarterly Estimates going out 4 quarters. As well as EPS Annual Estimates and Total Revenue Annual Estimates going out 4 years.

  Fundamental Scanner Tab – Search for companies based on a variety of fundamental criteria including: Minimum Price, Maximum Price, Minimum Average Volume, Minimum EPS, Minimum PE Ratio, Minimum Dividend Yield, and Minimum Beta. The results can them be sorted by Closing Price, Average Volume, EPS, Annual Dividend, PE Ratio, Beta, Company Group and Sector.

- **6 NEW Name Brand Systems**

  Conners RSI Expert Advisor -- Based on formulas presented by Larry Conners and Ashton Dorkins, a 2-period RSI at extreme highs or lows is used for long and short entry signals.

  Stochastic Pops Expert Advisor -- Combining a weekly Stochastics Oscillator for trend with a daily Stochastics for signals, this system avoids many of the whipsaw trades common to systems using just daily Stochastics.

  1st Hour Breakout - 5 Minute Bars Expert Advisor (Only available in MetaStock Pro) – Working on the idea that the first hour of trading sets the tone for the rest of the day, this system signals any movement outside the first hour's activity, including a stop loss in the opposite direction equal to the first hour of trading.

  Turtle Trader (Hybrid) -- Based on the well-known and widely published Turtle System, this system generates buy signals when the price moves above highest high of the last 20 days. Short signals are generated when the price moves below the lowest low of the last 20 days. Positions are closed when prices reach the extremes of the previous 10 days.

*. This item requires access to MetaStock Pro for Quote Center with an active MetaStock Pro For Quote Center subscription..

SPIDER Carpe Diem – Designed to forecast a single days Movement of the S&P's 500 Depository Receipts (SPIDER) this system is based on a four-bar pattern that has shown predictive ability.

Darvis Box -- using extreme high and low conditions to form dynamic support and resistance levels, which are captured in the form of a "box," this system great for uptrend breakout trading.

- **43 NEW Adaptive Indicators**

  Standard indicators use a fixed look-back period, which makes them less responsive to prevailing market conditions. MetaStock 11 incorporates 43 Adaptive Indicators with dynamic look-back functionality based on volatility, cycle, or a combination of both. This method provides the most responsive and accurate results.

- **6 NEW RMO Alerts**

  The Rahul Mohindar Oscillator (RMO) released with MetaStock 10 has become one of the most popular features of MetaStock. MetaStock 11 offers 6 new alerts for the RMO, including: buy above high, sell below low, new blue bar, new red bar, entering bullish zone, and entering bearish zone.

- **17 New Indicators**

  Coppock Curve, Darvas Box High, Darvas Box Low, Denvelopes, Donchian Channels, Elder Ray, Fisher Transformation, Gann Swing Bands, Inverse Fisher Transformation of RSI, Natenberg's Volatility, Polarized Fractal Efficiency, Pring KST (short, intermediate, and long-term), Stochastic RSI, Force Index, and Turtle Trader Bands.

- **4 New FOREX Currency Pair Systems**

  Employing the "3-V" approach (Velocity, Verticality, and Volatility), and using different indicator types to offer superior performance, MetaStock has created the following currency pair systems for: EUR/USD, GBP/USD, USD/CHF and USD/JPY.

- **2 New Stops**

  MetaStock 11 provides two new stops, plotted as indicators, to help your system know when it's time to get out of the trade:

  Intellistops are adaptive and adjust dynamically based on the current price activity of the security. Intellistops adjust according to cycles, volatility, and other conditions.

  Chandelier stops "hang" the sell stop from the extreme high reached over a predetermined period. When used properly, in tandem with other trading systems, Chandelier stops have been shown to produce profits even with randomly selected entries on a diversified group of futures.

The Workplace

Microsoft Windows Standard Features

This section explains the commands in MetaStock that are standard to Microsoft Windows.

Window resizing

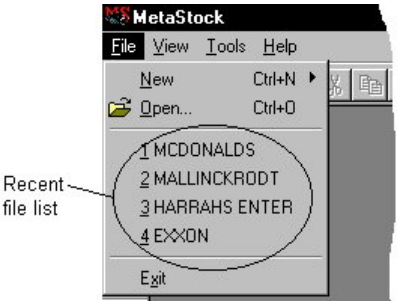
Clicking on a window's frame allows you to resize the window.

A resized window retains the size you gave it, and will reopen at the previously set size. Windows and dialogs that can be resized include:

- Add Favorites window
- Choose a Security dialog
- Collection Report window
- Data window
- Expert Advisor dialog
- The Explorer dialog
- Exploration Editor dialog
- Exploration Reports window
- Exploration Security Column Data window
- Expert Commentary window
- Indicator Builder window
- Indicator Builder Edit window
- Layout window
- QuickList Properties window
- System Editor dialog

Recent File List

The four most recently opened or closed charts, Smart Charts, or layouts are displayed at the bottom of the **File** menu. To open one, you can either click it with the mouse, highlight it and press ENTER, or choose the number (with the **File** menu displayed) that corresponds to the one you want to open.



An expanded list of your most recently opened items is available in the Open dialog by choosing the History shortcut (page 95).

You can also create a list of favorite charts, Smart Charts, layouts, and folders which can be accessed in the Open dialog by choosing the Favorites shortcut (page 93).

Exiting MetaStock

There are two ways to exit MetaStock:

- Choose **File>** Exit, or
- Click the close button in the upper-right corner of the screen.

Close button

Note: If any of your open charts or layouts have been changed, you will be asked if you want to save them prior to exiting. Smart Charts will be saved automatically.

Edit Menu

Undo, Redo

Undo button

To cancel the most recent command or action completed, choose **Edit>** Undo, or click the Undo button in the main toolbar. This command is useful if you've deleted something by accident or if you don't like the results of your last action. Undo returns MetaStock to the condition prior to your last action.

Note: If nothing is available to "undo," the command is disabled.

To cancel the results of the most recent Undo command, choose **Edit>** Redo. There is no tool bar button for this command. The redo command redoes the command or action you just undid. As with undo, if nothing is available to "redo," the command is disabled.

Cut, Copy, Paste

The Cut, Copy, and Paste commands are located on the Edit menu.

Cut button

Choose **Edit>** Cut to move the selected object's data (i.e., price values, indicator values, or moving average values) to the Windows clipboard. You can then transfer the clipboard information to another Windows application (such as a word processor or spreadsheet) using the Paste command. For information on creating OLE links using these commands, see page 12.

Copy button

Choose **Edit>** Copy to copy the selected chart or the selected object's data (e.g., price values, indicator values, etc.) to the Windows clipboard. You can then transfer the clipboard information to another Windows application (such as a word processor or spreadsheet) using the Paste command. You can also press CTRL+SHIFT+PRINT SCRN to copy a chart to the clipboard.

Paste button

Choose **Edit>** Paste to transfer the information in the Windows clipboard to the insertion point of the current window.

See your *Windows User's Manual* for additional information concerning these commands.

To copy indicator or price values to a Windows spreadsheet

1. Display the desired indicator or security plot.
2. Select the plot by clicking the left mouse button anywhere on the indicator or price plot. After you click, small black handles will appear on the plot to show that it is selected.
3. Choose **Edit>** Copy.
4. Open (or switch to) your spreadsheet.
5. Click on the cell you wish to copy the plot's data to.
6. Choose **Edit>** Paste in the spreadsheet.

To copy a chart to a Windows word processor document

1. Display the desired chart in MetaStock.
2. Select the chart by clicking anywhere on the chart's background.
   Make sure you have *not* selected an individual object within the chart. You should also make sure that the chart is *not* maximized; otherwise the toolbar will be included.
3. Choose **Edit>** Copy.

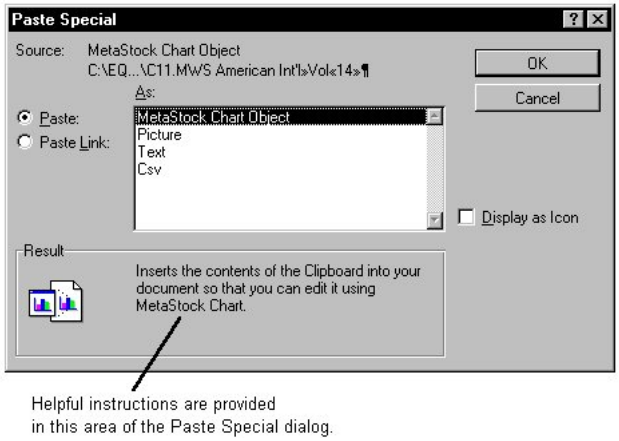
4. Open (or switch to) your word processor document.
5. Position the cursor at the desired location within the document.
6. Choose **Edit>** Paste in the word processor.

Creating OLE links

One of the great features found in many programs designed for Microsoft Windows (starting with Windows 98) is the ability to create links between programs using OLE (object linking and embedding). For example, you could create an OLE link between MetaStock and Excel. Data that exists in the Excel spreadsheet could be plotted in MetaStock. If the data changes in Excel, the changes will also be made in MetaStock because of the OLE link.

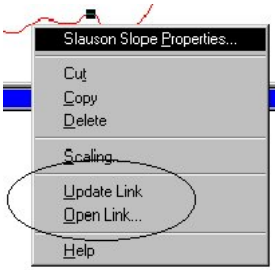
OLE links are created by copying data in one OLE-compatible Windows application and then pasting it (using **Edit>** Paste Special) to the other application.

The following illustration shows the Paste Special dialog found in Microsoft Excel (typical of others).



When using the Paste Special dialog, be sure to look at the helpful messages at the bottom of the dialog. These instructions will guide you through the process of creating the link.

If you right-click on an indicator in MetaStock that has been paste-linked from another application (i.e., Excel, Lotus 123, etc.), two options appear in the shortcut menu—Update Link and Open Link.



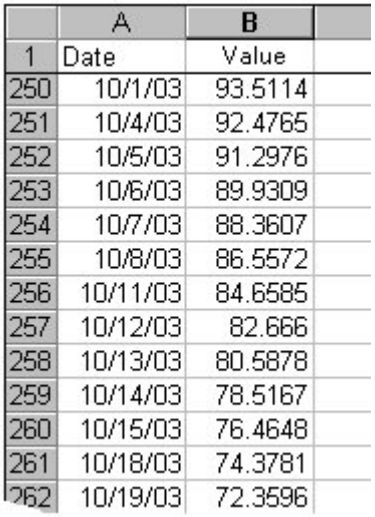
Choose Update Link to refresh the indicator in MetaStock with the data from the server application (i.e., Excel, Lotus 123, etc.). Choose Open Link to open the server application so that you can edit the data in the server application.

Note: Links to a real-time chart in MetaStock Professional can adversely affect MetaStock's performance, especially if intense calculations are involved. A warning message appears if you attempt to create an OLE link to a real-time chart.

To create an OLE link between a MetaStock chart indicator and an Excel spreadsheet

1. Display the desired chart and indicator in MetaStock.
2. Right-click on the indicator plot and choose Copy from the shortcut menu.
   Notice that you could also copy the security's prices instead of the indicator (if desired).
3. Open (or switch to) your spreadsheet.
4. Position the cursor at the desired location within the spreadsheet.
5. Right-click on the cell and choose Paste Special from the shortcut menu.
6. Choose the Paste Link radio button and select Csv from the list. (Csv stands for "*C*omma *S*eparated *V*alues".)

7. Click **OK**.



	A	B
1	Date	Value
250	10/1/03	93.5114
251	10/4/03	92.4765
252	10/5/03	91.2976
253	10/6/03	89.9309
254	10/7/03	88.3607
255	10/8/03	86.5572
256	10/11/03	84.6585
257	10/12/03	82.666
258	10/13/03	80.5878
259	10/14/03	78.5167
260	10/15/03	76.4648
261	10/18/03	74.3781
262	10/19/03	72.3596

Note: Excel 7.0 and earlier can only handle a Paste Link of about 1,000 records. Excel 97 and later do not have this limitation.

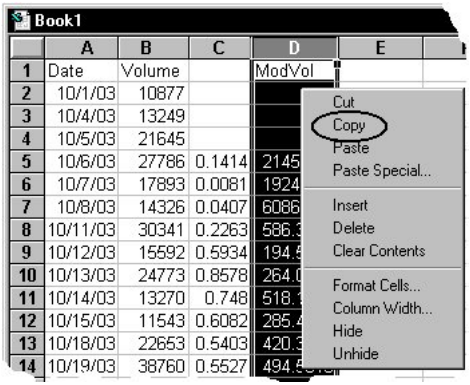
The link has now been created. If changes are made to the indicator in MetaStock (e.g., different number of time periods, etc.) the changes will automatically be reflected in the spreadsheet —even if the spreadsheet is not open.

To link data in an Excel spreadsheet to MetaStock

At this point you can perform further calculations on the indicator values in Excel if desired. Once these new values are calculated, they can be linked back to MetaStock and plotted in a new inner window by doing the following:

1. Select the entire column of newly calculated values in the spreadsheet by clicking on the column heading.
2. Right-click on the selected column and choose Copy from the shortcut menu. In the illustration below, columns A and B are

the values linked from MetaStock. Column D is the newly calculated values that will be linked back to MetaStock.

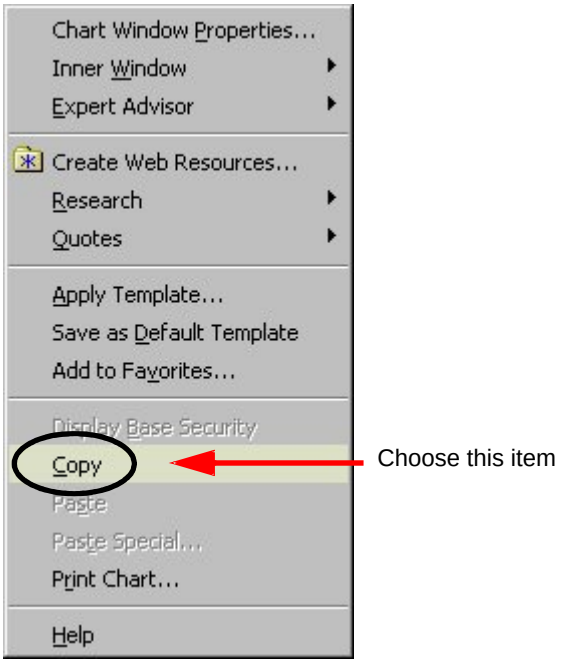


3. Switch back to MetaStock.
4. Choose **Window>** New Inner Window to open a new inner window in the chart.
5. Right-click on the new inner window and choose Paste Special from the shortcut menu.
6. Choose the Paste Link radio button and select Csv from the list.
7. Click **OK**.

To link a MetaStock chart with a Word document

Now to really exploit the power of OLE, you could create a third link between the MetaStock chart and your Word document.

1. Right-click on the chart and choose Copy from the shortcut menu.



2. Open (or switch to) your Word document.
3. Position the cursor at the desired location within the document.
4. Choose **Edit>** Paste Special in Word.
5. Select the Paste Link radio button and select MetaStock Chart Object from the list.
6. Click **OK**.
7. Switch back to MetaStock and draw a trendline on the chart. Watch the chart in Word as the trendline appears through the power of OLE.

Now whenever you change the parameters (e.g., the number of periods in a moving average) in the original indicator within MetaStock, the spreadsheet will automatically reflect the changes. The spreadsheet will then perform the additional calculations and plot the results in the new inner window back in MetaStock.
The chart in the Word document will also be updated. And what's more, MetaStock's Smart Chart feature keeps the OLE links. So the next time you load the chart, all of the above steps and calculations will be performed seamlessly.

OLE Tips

- To insure proper date alignment when creating a link from an Excel spreadsheet to a MetaStock chart, you can copy the Date column along with the data values.
- You can drag and drop an indicator or price plot from MetaStock to a spreadsheet. Before dropping the plot into the spreadsheet, however, make sure that the "not" sign next to the mouse pointer has disappeared. (This may take a moment, depending on the speed of your computer and the amount of data).
- The faster your computer and the more memory it has, the better OLE links will perform.
- When creating a link from a spreadsheet to MetaStock, the text in the top cell of the column is automatically displayed in the inner window title bar.
- When using the Paste Special dialog, look at the information at the bottom of the dialog if you need help.
- You don't have to have all the applications open in order for the OLE links to remain up-to-date. Once an OLE link is established the exchanging of information occurs seamlessly in the background.

"Not" sign

Delete

Choose **Edit>** Delete to delete a selected object.

For example, if you want to delete a moving average, select the moving average, and choose **Edit>** Delete. The Delete command is also available from an object's shortcut menu.

Note: If you have the "Confirm Deletion of Objects" option enabled in the Applications Properties dialog (page 41), a dialog will appear after you make the delete request, asking you to confirm the deletion.

References:
- For more information on deleting price plots, see page 178.
- For more information on deleting indicators, see page 248.
- For more information on deleting line studies, see page 190.

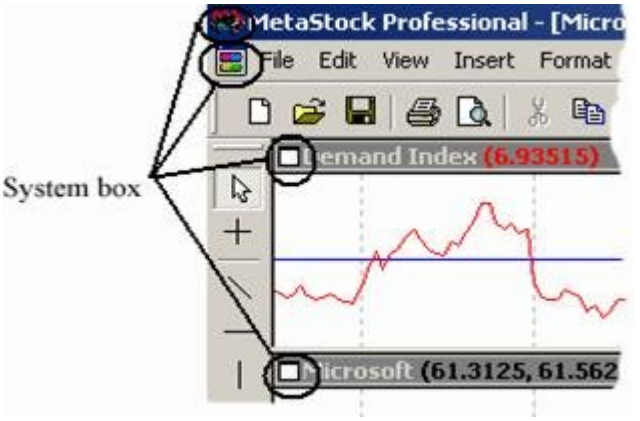
To delete an object from a chart

1. Right-click on the desired object (i.e., line study, indicator, or price plot).
2. Choose Delete from the object's shortcut menu.

System Menus

System box

The upper-left corner of every window contains a square box called the system box. The application window, the chart windows, and even the charts' inner windows have a system box. Click the system box to display the window's system menu.



The **System** menu contains commands to move, resize, and close the window. The Next command in a chart window's system menu is used to switch to the next open chart.

Accessibility Options

MetaStock supports all of the Accessibility Options found in your Windows Control Panel. These options allow you to customize windows to suit varying eyesight, hearing, and motor skills without requiring any additional expenditure on software or hardware. Refer to your Windows Help system for more information on using these options.

To adjust the Accessibility Options on your computer system

1. Click the Windows **Start** button.
2. Choose Control Panel (if this is not immediately visible in the right-hand column, look for it under the Settings menu).
3. Double-click the Accessibility Options icon.

Note: If the Accessibility Options icon is not displayed in your Control Panel, you will need to install it using Windows Setup. Choose Add/Remove Programs from the Windows Control Panel to access Windows Setup.

Windows

Minimize/ Maximize buttons

All windows can be minimized or maximized by clicking on the minimize button, or maximize buttons, located in the top right corner of the window.

Restore button

To restore a minimized or maximized window to its previous position, click the Restore button.

Close button

Any window can be closed by clicking the Close button

Clicking on a window's frame allows you to resize the window. A resized window retains the size you gave it, and will reopen at the previously set size.

An inner window is a window within a chart window that can be controlled within the confines of the chart window. A chart can contain up to 10 inner windows. The most common reason for opening an inner window is to plot an indicator. However, price plots are also contained within an inner window.

The Arrange Inner Windows command is available from the Chart shortcut menu by right-clicking on an inner window. You can also choose **Window>** Arrange Inner Windows. This command resizes the inner windows within a chart so they are equally sized.

References: For more information on working with inner windows, see page 112.

Windowing Commands

The Tile, Cascade, and Arrange Icons commands in the **Windows** menu are common to most Windows applications. The Stack and Column commands are unique to MetaStock.

Cascade button

Cascade arranges the open chart windows alphabetically in an overlapping formation so that only the title bars of all but the front chart are visible.

Column button

Column arranges the open chart windows alphabetically from left to right in vertical columns alphabetically so that all are completely visible on the screen.

Stack button

Stack arranges the open chart windows alphabetically so that the charts are stacked on top of each other and are fully visible. Arranging them in a stacked formation allows you to easily compare charts across their date axes.

Tile button

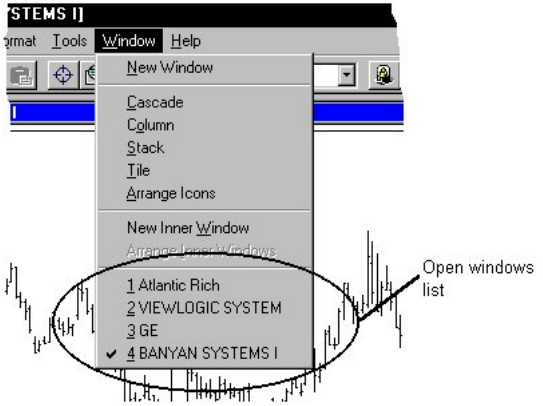
Tile arranges the open chart windows alphabetically from left to right and top to bottom so that all are completely visible on the screen.

Auto Tile button

Auto Tile automatically tiles the open chart windows. This feature is useful when you add new charts. The Arrange Icons command arranges all chart icons at the bottom of MetaStock's workspace.

Open Windows List

The bottom section of the **Window** menu lists the names of each of the open charts (or layouts) in the order in which they were opened. A check mark designates the currently selected chart.



To switch between charts using the **Window** menu, click on the desired name. You can also switch by simply clicking directly on the desired chart in the MetaStock workspace. The selected chart has a unique heading background color.

References: For more information, see page 107.

Right Clicking for Commands

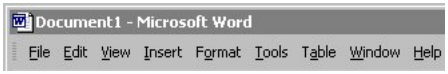
MetaStock is an object-oriented program. "Object orientation" means that the commands for objects are contained within the objects themselves. Rather than having to search a maze of menus and toolbars, you can access commands directly from the objects.

- Each object's commands are displayed with a right mouse click. The commands in the shortcut menu depend upon what you click.
- Right-clicking on a datasheet displays a shortcut menu that allows you to insert and delete rows, adjust for splits and distributions, or adjust data manually.
- Right-click on the toolbar to turn it on or off, or to change its properties.

Using Menus

MetaStock's menu organization, and many other program features, are similar to Microsoft Office applications. Notice the similarities between the MetaStock, The DownLoader, and Word menu bars.

Microsoft Word:

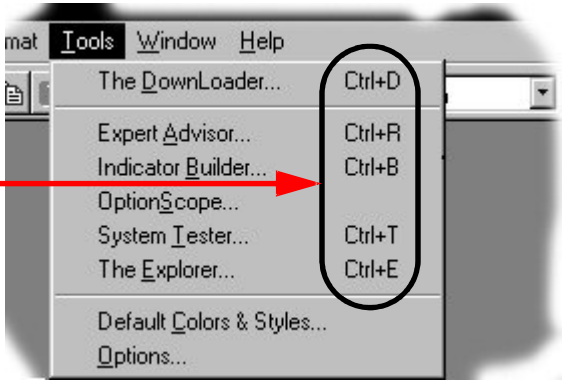


MetaStock:

The DownLoader:

Many of the menu commands can be accessed with special keystroke combinations called "accelerator keys." For example, instead of choosing Enhanced System Tester from the Tools menu, you could press the accelerator key CTRL+T. If a command has an accelerator key, it is shown in the menu next to the command. Many menu items also have a picture displayed next to them. Clicking this same icon on a toolbar runs the command without using the menus.

Accelerator key combinations let you bypass menus



To select a command using the menus

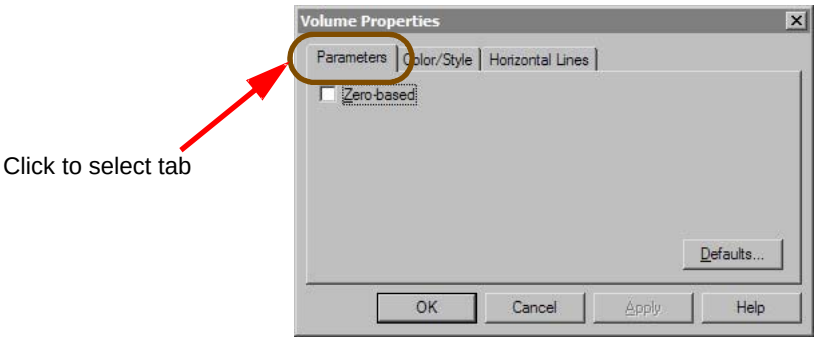
1. Click the left mouse button once directly on the menu item (e.g.: File, Edit, View, etc.).
2. When the menu drops down, click once on the desired command.

Using Dialogs

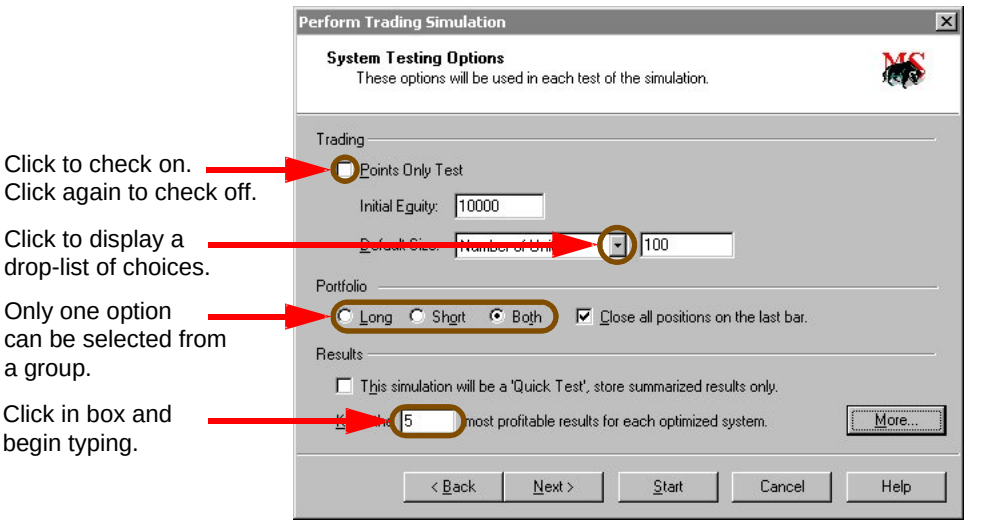
After you choose a command, a dialog often appears. A dialog is used to select options pertaining to the command or feature. If an option in a dialog is dimmed, this means the option is not available.

Some dialogs provide various sets of options. These sets of options are divided into tabbed pages. For example, the System Testing Options dialog has two tabs: Testing and Reporting. Click on the tab to display the page's options.

Some dialogs provide various sets of options. These sets of options are divided into tabbed pages. For example, the dialog shown below has three tabs. Clicking on the tab displays the page's controls.

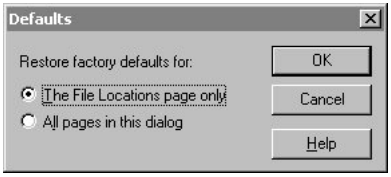


The following dialog is a good example of the various other controls within a dialog.



Restoring Factory Defaults

Every *Properties* dialog in MetaStock contains a **Defaults** button. Clicking this button opens the Defaults dialog. Clicking the **Defaults** button in any other dialog sets the options in the dialog to the original default settings as they were shipped.



Using Toolbars

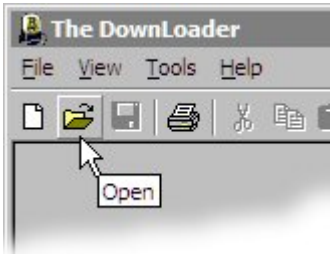
The tools on the toolbars give you quick access to many of the commonly used commands and features in MetaStock and The DownLoader.

To select a command using the toolbar

1. Position the mouse over the desired tool button.
2. Click the left mouse button once.

To find out the name of a tool

To find out the name of a tool, hold the mouse pointer motionless over the tool for about a second and a ScreenTip will appear showing the name of the tool or button.



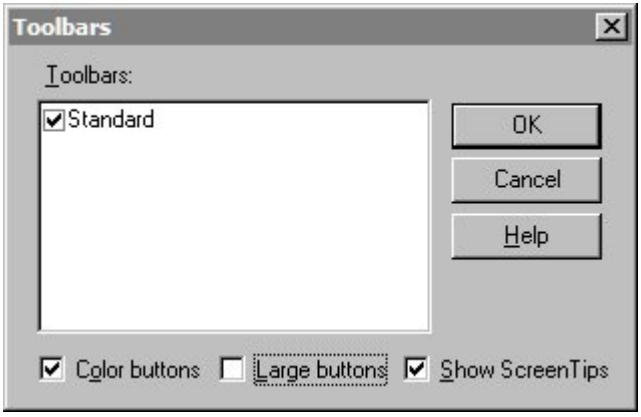
The status bar also provides a brief description of the tool on which the mouse is positioned (see page 33).

To select a command using the toolbar

1. Position the mouse over the desired button.
2. Click the left mouse button once.

Displaying/Removing Toolbars

Some people remove the toolbars to provide more space for charts. You can control which toolbars appear with the Toolbars dialog. Choose **View>** Toolbars to open it.



You can control the toolbar's button color, size, and ScreenTip display with the checkboxes at the bottom of the dialog. You can also right-click on any toolbar and check/uncheck the desired toolbars from the shortcut menu.

Line Study Toolbars

You can choose to have separately displayed toolbars for each of the groups of line studies (i.e., Trendline, Gann, and Text). Or you can just choose the Line Studies toolbar. The Line Studies toolbar contains rotator arrows that allow you to rotate between the three groups of line studies. For illustrations of the Line Study toolbars, see “The Five Groups of Line Studies” on page 187.

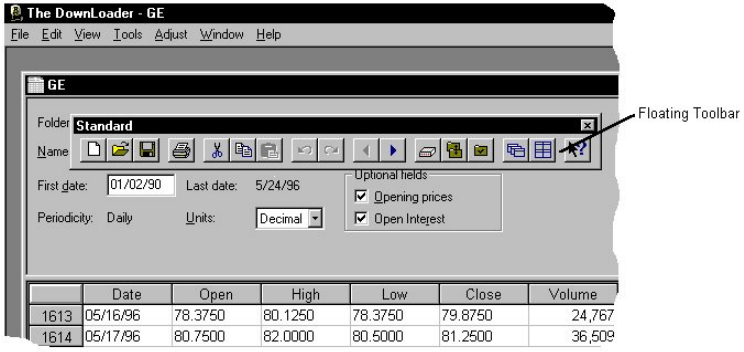
Floating and Docking Toolbars

MetaStock toolbars can be moved anywhere on the screen by undocking and floating.

To float and dock the toolbar

1. Double-click on the toolbar. The tools will now appear in a floating window.

   Note: To make this work, you *must* double-click on an area of the toolbar that is between or below the toolbar buttons.

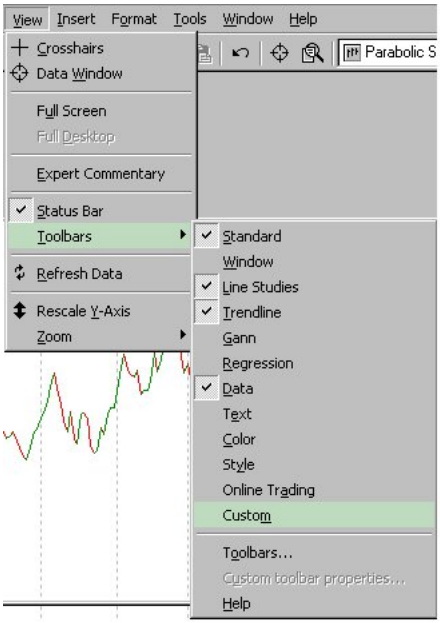


2. Click and drag the toolbar to the desired location. If you want the toolbar docked on the screen’s edge, drag the toolbar until the mouse appears over the edge. The drag box will change shape to indicate that it can be docked.
3. To return a floating toolbar to its docked location, simply double-click the title bar of the floating toolbar’s window.

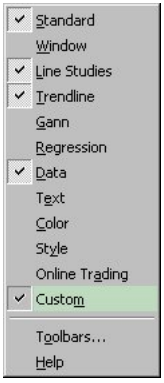
Custom Toolbar

The custom toolbar provides shortcut buttons to your favorite charts, layouts, templates, and even other documents and programs.
To display the custom toolbar, you have two options:

- Choose **View>** Toolbars> Custom.



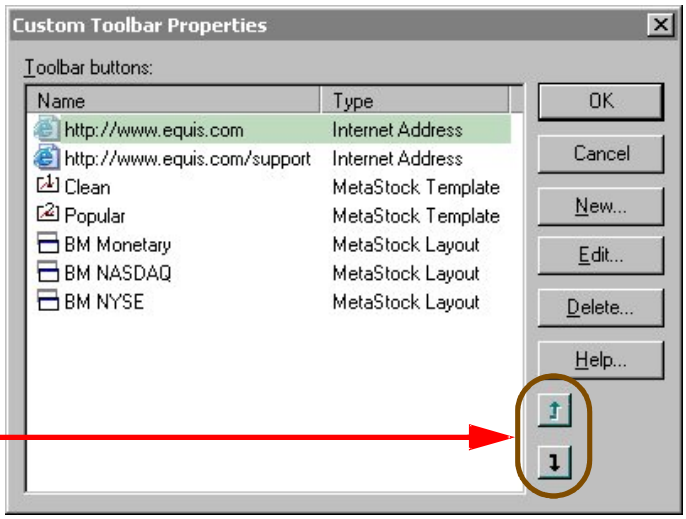
- Alternatively, you can right-click on any toolbar and choose Custom from the shortcut menu to display the Custom toolbar.



Edit the Custom Toolbar

To edit the items shown on the custom toolbar, choose **View>** Toolbars> Custom Toolbar Properties, or right-click on the custom toolbar and choose Custom Toolbar Properties from the shortcut menu. The Customize dialog will appear from which you can edit, delete, and create new custom shortcut buttons.

Click these to change the order of the shortcut buttons

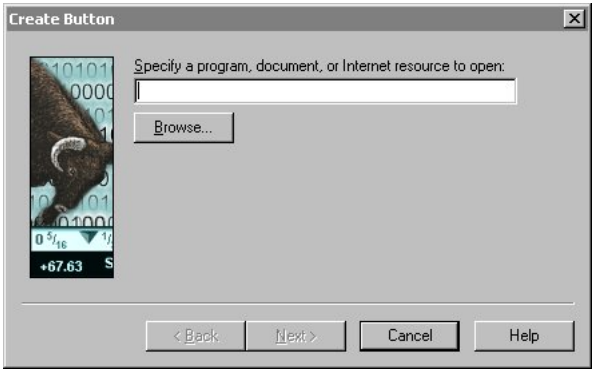


- To change the path, icon, or screen tip for an existing shortcut, select the item, then click **Edit**.
- To change the order in which the icons are displayed, use the arrows displayed to the right of the shortcut list.

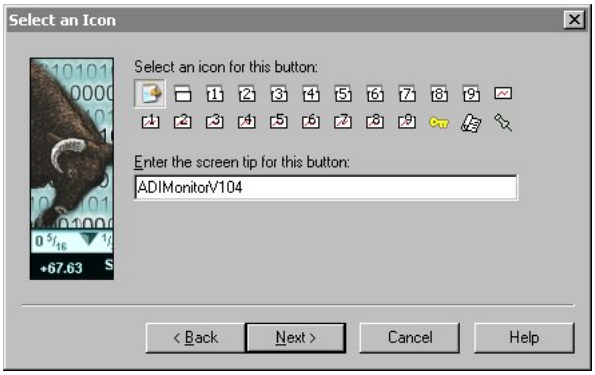
To add a new item to the toolbar

To add a new item to the toolbar:

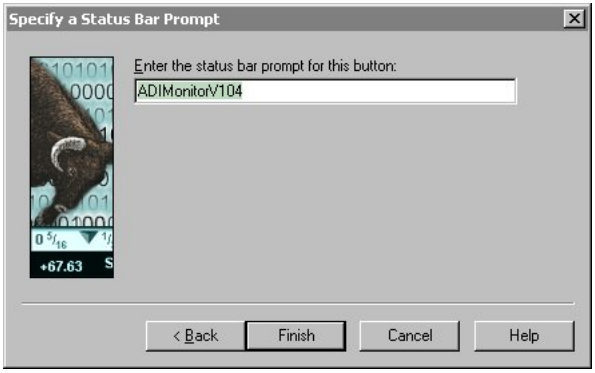
1. Click **New**.
   The Create Button dialog will appear.



2. Click **Browse** to navigate to the item you are adding.
   This can be a chart, layout, template, document, application, URL, etc.
   If you choose a document, the application used to edit that type of document will start when you click on that shortcut. If you know the path to the item you are adding, you may simply type the path in the box.
   (i.e.: `c:\program files\equis\MetaStock\charts\colorful.mwt`)
3. After you have selected the item or typed the path, click **Next**.
   The "Select an Icon" dialog will appear.



4. Choose an icon to represent this item on the toolbar. The first selection will be the icon Windows uses for this file.
5. Enter the **screen tip** for this button.
   This is the supplemental text that appears when you hold the mouse pointer over this button.



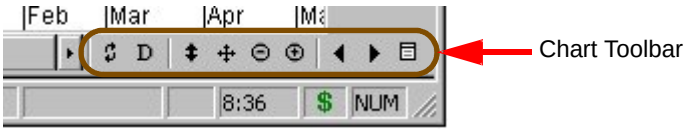
6. Enter the **status bar prompt** for this button.
   This is the text that appears in the status bar when you hold the mouse pointer over this button.

To add an item to the custom toolbar

1. Either
   - Choose **View>** Toolbars> Custom Toolbar Properties, or
   - Right-click on the Custom toolbar and choose Custom Toolbar Properties from the shortcut menu
2. Click **New**.
3. Click **Browse** and navigate to the item you are adding, or type the path in the box, then click **Next**.
4. Choose an icon to represent this item on the toolbar.
5. Type the name of this icon as you want it to appear in the screentip. Click **Next**.
6. Type the name of this icon as you want it to appear in the status bar, then click **Finish**.

Chart Toolbar

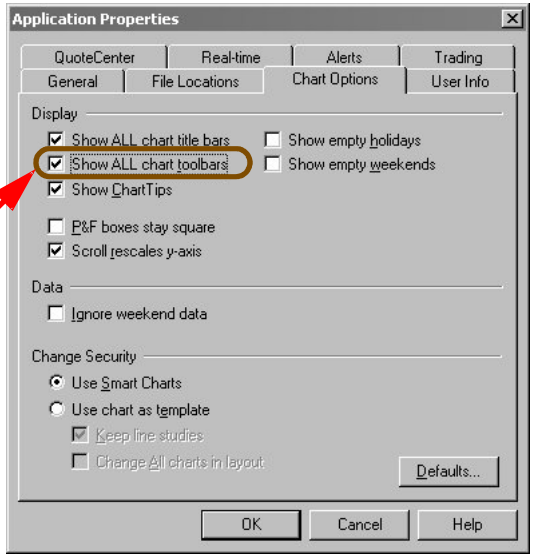
The chart toolbar appears at the bottom right corner of a chart. You can turn all chart toolbars on and off from the Application Properties dialog (page 41). You can remove an individual chart's chart toolbar by right-clicking on the chart toolbar and choosing Remove Toolbar from the shortcut menu.



The chart toolbar can be displayed or removed using any of the following methods:

- Use the Show All Chart Toolbars option in the Application Properties dialog. The Application Properties dialog is displayed by right-clicking on the Application's menu bar or by choosing **Tools>** Options.

Show ALL chart toolbars option

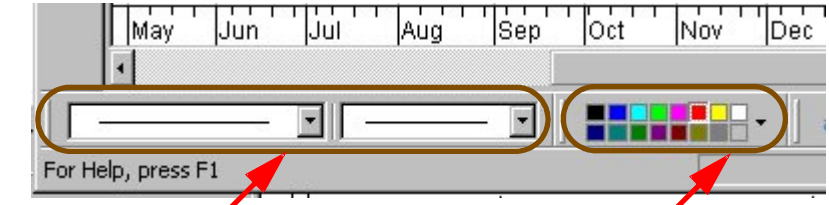


Notes

- If you have removed a data toolbar from a currently displayed individual chart, the Show All Chart Toolbars box in the Application Properties dialog has a gray square in it. This is just a visual reminder that checking the box will turn on an individual chart's chart toolbar that you have previously turned off.
- Right-click directly on the chart toolbar and choose Remove Toolbar. or use the Show Chart Toolbar option in the Chart Window Properties dialog (page 108).
- This only removes the toolbar for the selected chart.
- For more information on the options in the Applications Properties dialog, see page 41.

Color and Line Style Toolbars

The Color and Style toolbars allow you to quickly change the color, line style, and weight of the selected plot (i.e., indicator, price, or line study).



To change the color or line style of a plot

1. Select the plot (i.e., indicator, price, or line study) by clicking directly on the plot. Small black boxes appear on the plot showing that it is selected.
2. Choose the desired color or line style from the toolbar.
   To see more colors or to create custom colors, click the small triangle on the right side of the color toolbar and click **More Colors**.

Note: If you select a heavier line weight, the style will always appear as a solid line. However, the display will use the line type selected.

To create custom colors

1. Click the small triangle on the right side of the color toolbar.
   The color toolbar expands, and the **More Colors** button appears.
2. Click the **More Colors** button. The Color dialog appears.
3. In the Color dialog, click anywhere in the color swatch to set the hue and saturation.
4. Use the slider on the right side of the dialog to adjust the luminosity (brightness).
5. Click the **Add to Custom Colors** button. The new color appears in one of the Custom Colors boxes in the lower left corner of the dialog.

Floating and Docking Toolbars

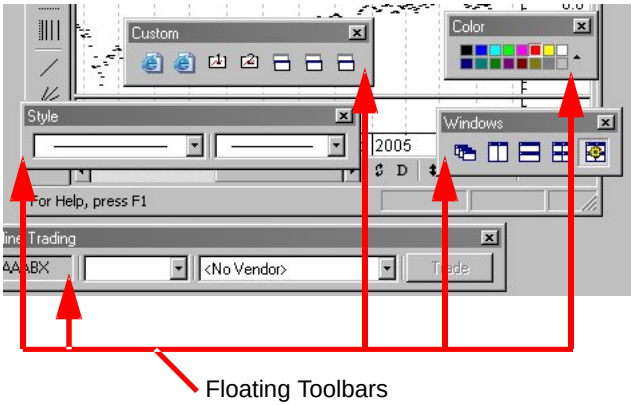
All toolbars (except for chart toolbars) can be moved anywhere on the screen you desire. Perhaps you are doing a lot of work with trendline studies. To decrease the distance the mouse must travel when using the trendline toolbar, you may want to move the toolbar closer to the area of the chart in which you are working.

QuickList button

If the Standard toolbar is docked on either the left or right side of the screen (so it appears vertically), the Indicator QuickList (page 239) changes to a button that displays the Indicators dialog.

To float and dock any toolbar

1. Double-click on the toolbar.
   The tools will now appear in a floatable window.

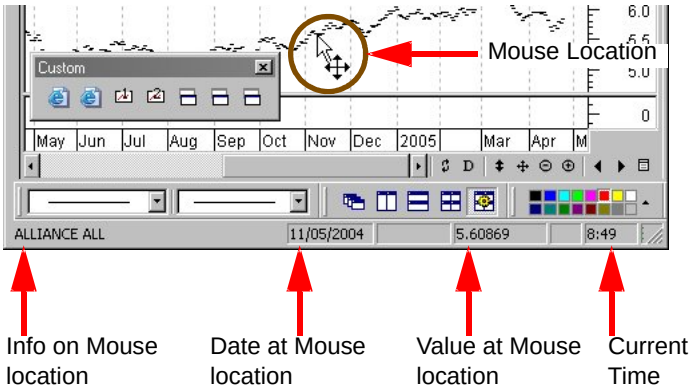


Note: You must double-click on an area between or below the toolbar buttons to float the toolbar or move the detached toolbar.

2. Click and drag the toolbar to the desired location. If you want the toolbar docked on the screen's edge, drag the toolbar until the mouse appears over the edge. The drag box will change shape to indicate that it can be docked.
3. To return a floating toolbar to its docked location, simply double-click on the title bar of the floating toolbar's window.

Using the Status Bar

The status bar appears at the bottom of the screen. It provides you with feedback on the location of the mouse pointer (i.e., menu commands, tools, line studies on a chart, and x-/y-axis coordinates). It also displays the current time.



As you move through menu commands, the status bar gives you a more detailed explanation of the highlighted command. When the mouse is positioned over a tool on the toolbar, a brief explanation of the tool is provided.

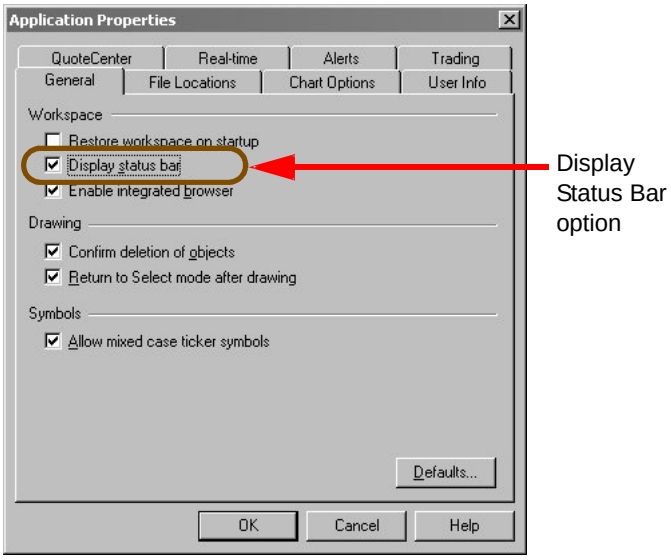
The status bar is also very helpful when selecting and modifying objects on a chart, such as indicators, price plots, and line studies. If you have numerous objects on a chart, the status bar is helpful in telling you which one the mouse is currently positioned over. This can be very helpful, especially when the objects are grouped close together.

As you move the mouse around on a chart, the x-axis (i.e., date/time) and y-axis values at the mouse location are continuously updated. This can be useful for such tasks as drawing support/resistance lines (page 306) to help you locate an exact price level, drawing trendlines (page 187) to help locate more precise date and price coordinates, etc.

You can use the Data Window for more detailed information on price values at the mouse pointer location (page 180).

Displaying/Removing the Status Bar

The status bar can be displayed or removed using the Application Properties dialog (see page 41). To display this dialog, choose **Tools>** Options or right-click on the application menu bar and choose Application Properties.



To display/remove the status bar

1. Choose **Tools>** Options from the menu.
2. On the General page, (un)check the Display Status Bar box.
3. Click **OK**.

For more information on the options in the Applications Properties dialog, see page 41.

Using a scrolling pointing device

If your mouse has a scrollwheel, (such as the Microsoft IntelliMouse™) or equivalent, the wheel gives you quick and convenient access to several commonly-used features in MetaStock and related applications.

Action	Effect
Rotate wheel	Scrolls chart/data pane
ALT + rotate wheel	Scan through charts/datasheets
CTRL + rotate wheel	Zoom in/out
SHIFT + rotate wheel	Change periodicity
Press wheel button and move	Autoscroll chart

Mouse

Scrolling Charts and Data Panes. When you have more data loaded than displayed, you are able to scroll through the data. To scroll forward using the scrollable pointing device, simply rotate the wheel (or its equivalent) forward (i.e. toward the monitor). To scroll back, simply rotate the wheel back (i.e. away from the monitor). For more information on scrolling through charts, see page 88. Alternatively, you can scroll the data pane by using the scroll bar on the right side of the data pane.

Scanning Charts and Datasheets. To scan from one chart to the next in your folder, hold the ALT key down and rotate the wheel forward (toward the monitor) to advance to the next security or rotate back to move to the previous security.
For more information on scanning charts, see page 138.
For more information on scanning datasheets, see page 656.

Zoom Scaling Charts. To zoom in or out on a chart, hold the CTRL key down and rotate the wheel forward (toward the monitor) to zoom in or back (away from the monitor) to zoom out.
For more information on zoom scaling, see page 131.

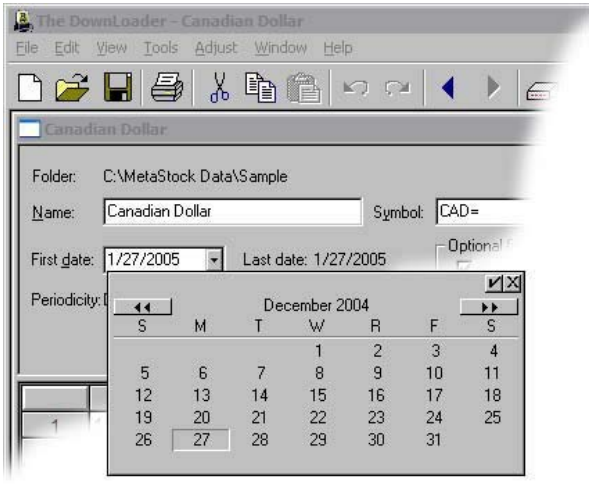
Change Periodicity of a Chart. To change the periodicity in a chart, hold the SHIFT key down and rotate the wheel forward (toward the monitor) to move to a shorter periodicity (e.g., weekly to daily) or back (away from the monitor) to move to a longer periodicity (e.g., weekly to monthly). For more information on periodicity, see page 121.

Autoscrolling Charts. To scroll through a chart automatically, press the wheel button (or its equivalent) on your pointing device. The pointer will change to a double arrow. Move the arrow left or right depending on which direction you wish to autoscroll. The further you move the arrow away from its origin the faster the autoscroll.

Note: The autoscroll feature will not occur unless the wheel button assignment set to "Default" in the Windows Mouse Properties dialog in Control Panel.

Drop-Down Calendars

When you click on a date field in a dialog (or in a datasheet within The DownLoader) a calendar appears to let you quickly scroll through previous and future dates. The illustration below is an example of the drop-down calendar in a datasheet from The DownLoader.



To enter or edit a date in a dialog

1. Double-click the down arrow button next to the date box to display the drop-down calendar.
2. Click the arrows to the right and left of the heading to cycle between months.
3. Double-click the desired day of month to place the date in the box.

To enter or edit a date in a datasheet

1. Place your mouse pointer in the desired datasheet date entry cell and press F4 to display the drop-down calendar.
2. Click the arrows to the right and left of the heading to cycle between months.
3. Double-click the desired day of month to place the date in the box.

Drop-Down Calendar

Using MetaStock's Help System

The *MetaStock User's Manual* and the help system are based on the same material. The help system is like having a manual that automatically turns its pages based on what you are doing. If you find that you need more help than what the manuals or help system provide, you can contact Equis' technical support (page 4).

The quickest way to find out how a specific feature in MetaStock operates is to use the online help system. MetaStock's help system can be accessed from every dialog within MetaStock by simply clicking the **Help** button, selecting **Help>** MetaStock Help, or pressing the F1 key.

Navigating the Help

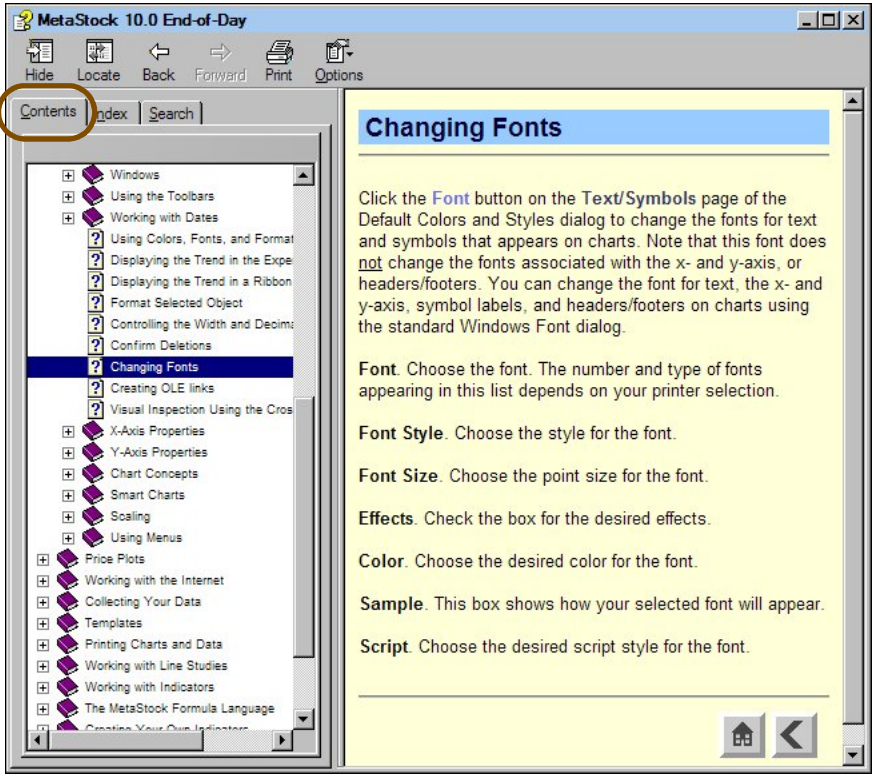
Help button

There are three primary ways of using the system. The method you choose depends on how you prefer to obtain information. When you are looking in a book for information on a specific topic, do you usually use the Table of Contents or do you use the Index? If you use the Table of Contents, then you'll probably feel more comfortable using the Contents page in the Help dialog. If you prefer the Index, you'll want to use the Index or Find pages in the Help dialog.

Contents

The Contents page is used to access MetaStock's Help Contents page. The Contents page is the main jumping off point for the on-line help system. It is organized very similarly to a Table of Contents in a book. But instead of turning the pages to reach the desired subject, you simply double-click on the topics.

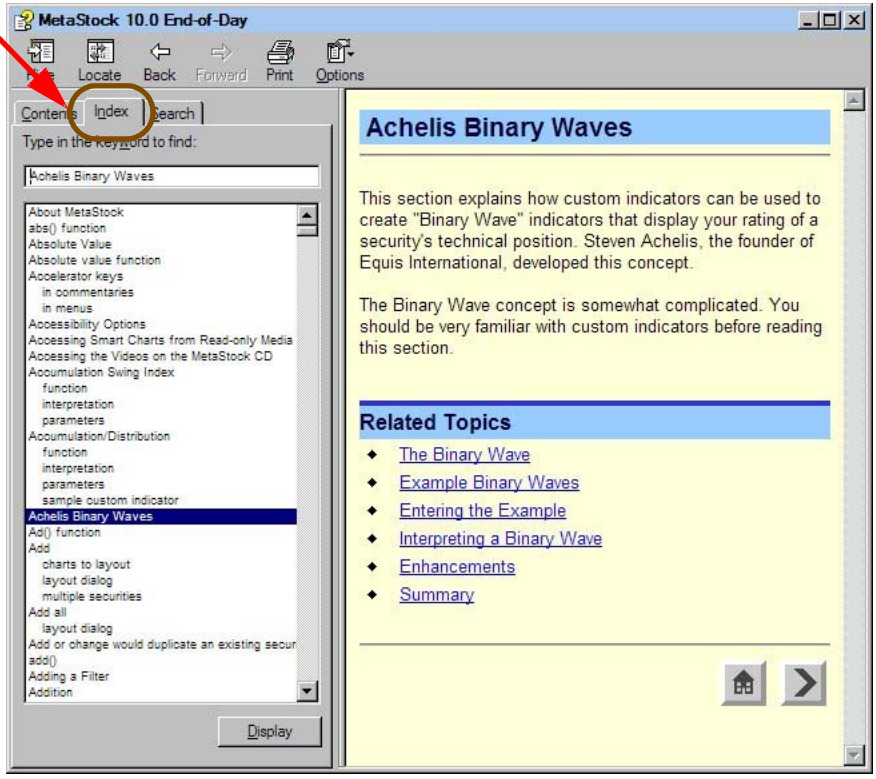
Contents



Index

The Index page is used to search for help on a specific topic by typing the first few letters of the topic you are looking for.
For example, suppose you want to find out how to print a chart. If you type the word “print” in the edit box, the index entry list will quickly display the keywords beginning with “Print.” Double-click “Print - charts” to display the corresponding help page.

Index Tab

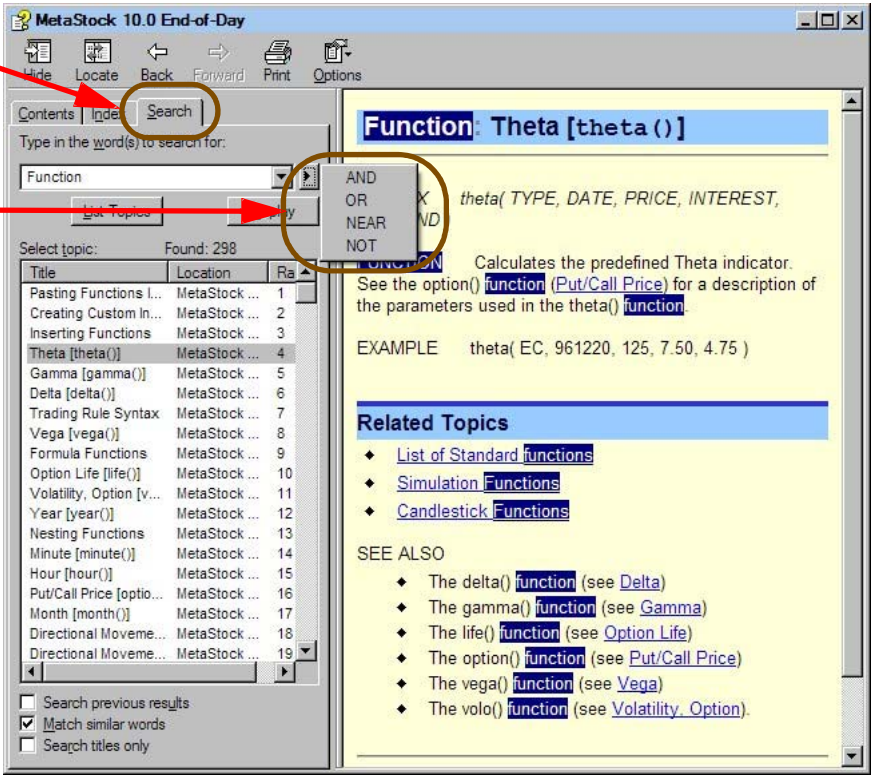


Find

The Find page is used to search for every occurrence of a word or phrase within MetaStock's help topics. This search is more extensive yet less selective than using the Index page. For example, suppose you want to find every occurrence of the word "resistance" within the help topics. If you type the word "resistance" in the edit box, every help topic containing the word "resistance" will appear in the list, and will be highlighted in the topic. You can expand or restrict your search using the boolean search option.

Search Tab

Boolean Search button/ menu



Context Sensitive Help

Context Sensitive Help button

The Context Sensitive command displays a "question mark" next to the mouse pointer indicating that you are in help mode. You can click the special help mode pointer on any of the menu commands, toolbar, or chart objects to display the corresponding help page. For example, clicking the help mode pointer on a chart's x-axis will display a help screen on the x-axis scales. Likewise, clicking on the **Print** button will display a help screen on printing. You can also press the F1 key when a menu command is highlighted to display help for that command.

Quickstart button

Quickstart Tutorials

The Quickstart Tutorials are a quick and easy way to get up to speed with MetaStock. These interactive videos are fun and informative for both the beginner and the experienced MetaStock user. To run the Quickstart Tutorials, choose **Help>** Quickstart Tutorials

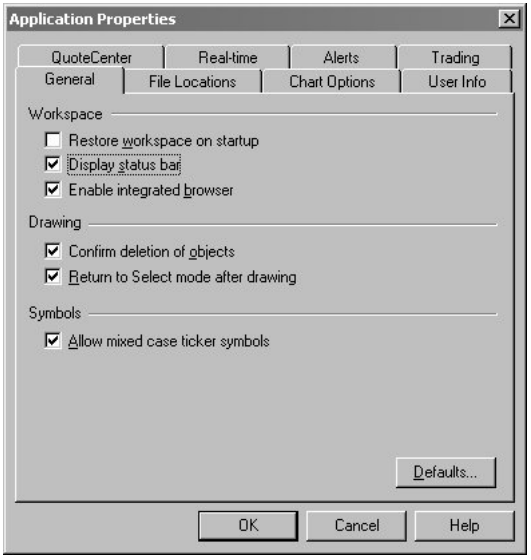
Changing the Appearance of MetaStock's Workplace

MetaStock allows you to configure its display so that it better matches how you want to view and interact with it.

Changing the Application Properties

Use the Application Properties dialog to choose from various options pertaining to the overall MetaStock application. You use this dialog to control the appearance of the general workspace, the location of files, your network user name, etc. You can access the Application Properties dialog by choosing **Tools>** Options or right-clicking on the menu bar.

General tab



Restore workspace on startup. Check this box if you want MetaStock's workspace to appear exactly as it did when you last exited the program. This includes all charts that were open.

Display status bar. Check this box if you want the status bar displayed (page 33).

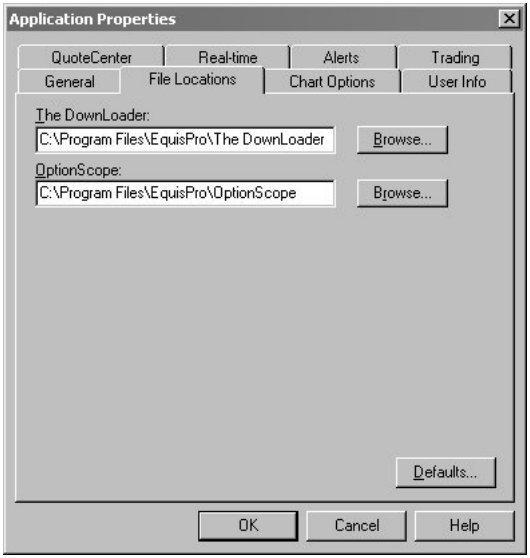
Enable integrated browser. Check this box if you want to view web pages requested by MetaStock in MetaStock's built-in web browser. If you do not check this box, your default web browser will be launched when you access a web page from within MetaStock.

Confirm deletion of objects. Check this box if you want MetaStock to prompt you to select "yes" or "no" each time you delete an object (e.g., trendline, indicator, etc.) from a chart (page 17).

Return to Select mode after drawing. Check this box if you want MetaStock to return to select mode (page 188) after drawing a line study.

Allow mixed case ticker symbols. Check this box if you want MetaStock to allow upper and lower case characters when creating new securities or adding new symbols to the Symbol Database. Mixed case symbols are required by some data vendors.

File Locations tab



The DownLoader. Type the path to The DownLoader folder. This is usually `C:\Program Files\Equis\The DownLoader`. For more information on using The DownLoader, see page 72.

OptionScope. Type the path to the OptionScope folder. This is usually `C:\Program Files\Equis\OptionScope`.

Chart Options tab

Show ALL chart title bars. Check this box if you want the title bars displayed for all charts. To control this option for individual charts, see page 108.

Show ALL chart toolbars. Check this box if you want the data toolbars displayed on all charts. To control this option for individual charts, see page 108.

Note: This box has a gray square in it if you have removed a data toolbar from a single chart that is currently displayed. This is a visual reminder that checking the box will turn on a chart's data toolbar that you have previously turned off.

Show ChartTips. Check this box if you want ChartTips to display next to the mouse pointer. ChartTips allow you to quickly display the values for a particular plot without invoking any special command. By simply positioning the mouse over a plot (e.g., price bar, indicator, moving average, etc.) and holding the mouse pointer motionless for a second or so, a ChartTip displays, giving you information about the plot.

P&F boxes stay square. Check this box if you want P&F boxes to stay square when plotting a Point and Figure chart. (page 169) Point and Figure charting purists prefer to have exactly square X and O boxes. The advantage of leaving the box *unchecked* is that the Point and Figure charts will utilize chart space much more efficiently.

Note: If you manually scale the y-axis, this option is ignored as it becomes impossible to keep the boxes square.

Scroll rescales y-axis. Check this box if you want the y-axis to automatically rescale when moving through the data using a chart's scroll bar. This will slow down the scrolling somewhat. You can also leave this box unchecked and manually rescale the y-axis using the Rescale Y-Axis button on the chart toolbar (page 89).

Ignore weekend data. Check this box if you do not want weekend data to be displayed in your charts.

Use Smart Charts. Check this box if you want each chart to load its individual Smart Chart (page 78) rather than retaining the previous chart's information when using the Change Security commands (page 84). You can also select this option in the Options tab of the "Choose a Security" dialog (page 86).

Use chart as template. Check this box if you want each chart to use the same set of indicators and styles rather than using each individual Smart Chart when using the Change Security commands. (page 84). You can also select this option in the Options tab of the "Choose a Security" dialog (page 86).

Keep line studies. Check this box if you want line studies to be transferred from one chart to the next when using the Change Security commands (page 84).

Note: This is disabled if you choose the Use Smart Charts option.

For most circumstances, you will probably want to leave this box unchecked, because a line study drawn on one security is rarely useful on another security's chart (without some adjustments). You can also select this option in the Options tab of the "Choose a Security" dialog (page 86).

Change All charts in layout. Check this box if you want to use a layout as a multi-chart template when using the Change Security commands (page 84). When selected, this option causes all charts in the layout to change to the new security when using the Next Security command (or Chart Toolbar button), the Previous Security command (or Chart Toolbar button), or the Choose a Security command (or Chart Toolbar button). If this option is not selected, only the active chart will be changed. You can also select this option in the Options tab of the "Choose a Security" dialog (page 86).

Show empty holidays. Check this box if you want a blank space displayed in place of market holidays. On line plots (page 164) this will cause a break to appear in the line. This option is primarily used by analysts interested in maintaining equal time/space relationships on their charts.

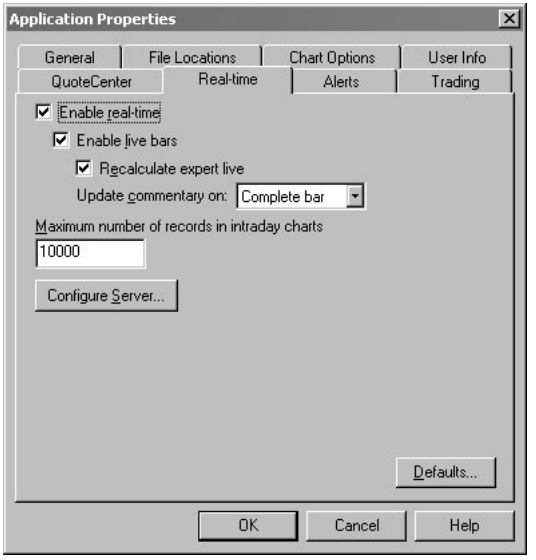
Show empty weekends. Check this box if you want a blank space displayed on the chart in place of weekends. On line plots (page 164) this will cause a break to appear in the line. This option is primarily used by cycle analysts interested in maintaining equal time/space relationships on their charts.

User Info tab

Name. Type your name. MetaStock uses this to identify you.

If you change your User Name, it does not take effect until the next time you run MetaStock.

Real-time Page



Enable Real-time. Checking this box allows intraday data to flow into MetaStock from your real-time data vendor. Note that real-time data will only flow into MetaStock Pro if your software is properly installed and running (see the *Getting Started* manual for more information).

Enable Live Bars. Check this box if you want the current bar to reflect the incoming real-time tick prices. If this is left unchecked, a bar will not appear until the end of the specified intraday interval (i.e., 1-minute, 5-minute, etc.)

Recalculate Expert Live. Check this box if you would like the experts that are attached to your intraday charts to recalculate and update with each new tick. If left unchecked, experts will only recalculate at the completion of each bar. A mathematically complex expert can be demanding on your system's resources, particularly with actively traded securities. If your system is struggling to keep up, you may want to leave this box unchecked.

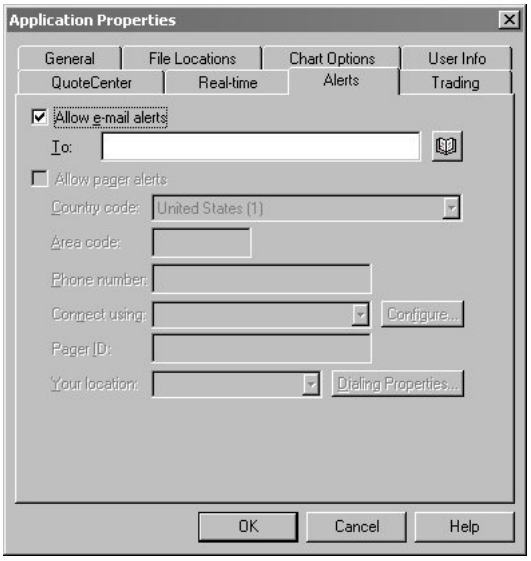
Update Commentary on. Choose when to update the expert commentary attached to a chart—with each tick, at the completion of each bar, or with the **Refresh** button only.

Maximum number of records in intraday charts. Enter the number of bars (or ticks) that a chart can display (between 200 and 65,500). If the number of bars exceeds this number, the oldest bars will automatically be removed from the chart. Note however, that no

data is actually lost, since MetaStock Pro stores all data to the security's files.

Configure Server. The Real-time Configuration dialog is used to configure various functions of the data, files, data vendor, and servers. For more information on this dialog, see page 65.

Alerts Page



Note:

Allow email alerts. Check this box to enable email notifications for Expert Advisor alerts (page 621). This feature requires a MAPI-compatible email program, such as Microsoft Exchange, Microsoft Outlook, Eudora, etc. If you do not have a MAPI-compatible email program installed on your computer, this box will be disabled.

To. Enter the email address to notify when an Expert Advisor alert is triggered (page 621).

Tip: To notify multiple email addresses, create a mailing list in your email program, then enter the mailing list in this box. The address book from your MAPI compatible email program will be displayed when you click the Address Book button.

Address Book button

Allow pager alerts. Check this box to enable pager notification when an Expert Advisor alert is triggered.

Caution: You may only use a pager that can receive data transfers. If you do not have a modem installed in your computer, this box will be disabled.

Country code. If a country code is required to make a call from your computer to your pager, enter the country code in this box.

Area code. Enter the area code for your pager.

Phone number. Enter the phone number for your pager.

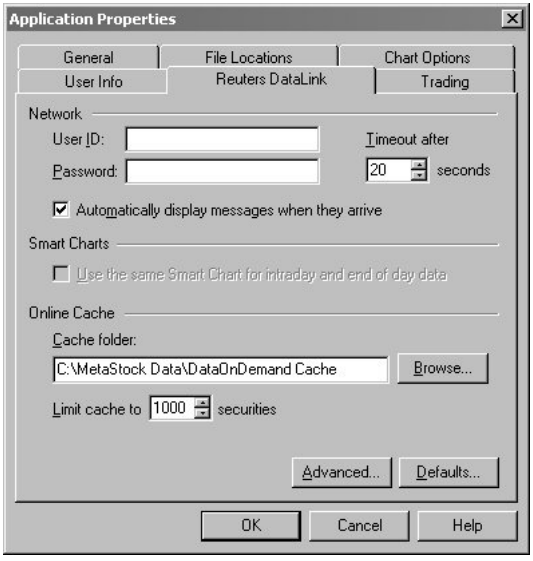
Connect using. Select a modem from the list. Click the Configure button to reconfigure the selected modem.

Pager ID. Enter your pager ID in this box. Your pager ID is assigned to you by your pager service provider.

Your location. Select the current location of your computer. Click the Dialing Properties button to reconfigure the selected location.

Online Data Vendor Page

The controls on the Online Data Vendor page of Application Properties are explained in detail in the vendor features chapter of your *Getting Started* manual. This page is available only if you chose an online vendor during installation.



Enlarging the Space Allotted for Charts

If you want more screen space allotted for your charts, you may want to try the Full Screen command (found in the **View** menu). Enabling Full Screen mode increases the space allotted for charts by about 10%. It does this by removing the application's title bar, the menu bar, and the status bar. You can even expand the screen further by removing the toolbars (see "Displaying/Removing Toolbars" on page 24).

The following illustration shows a maximized chart in Full Screen mode. Notice the **Close Full Screen** button in the bottom right corner of the screen.

Even though the menu bar is not visible in Full Screen mode, you can still access it with the accelerator keys (ALT+F, ALT+E, ALT+V, ALT+I, ALT+O, ALT+T, ALT+W, and ALT+H). For example, to access the **Tools** menu you can press ALT+T.

Restoring the Screen to Normal View

To return the screen to normal view while in Full Screen mode, click the **Close Full Screen** button that appears on the screen, or right-click on the empty workspace and uncheck the Full Screen option from the Application shortcut menu.

You can also press ALT+V and uncheck Full Screen in the **View** menu to return to normal view.

Using Dual Monitors with MetaStock

MetaStock supports dual monitor capacity. To maximize MetaStock on both monitors, choose **View>** Full Desktop.

Collecting Your Data

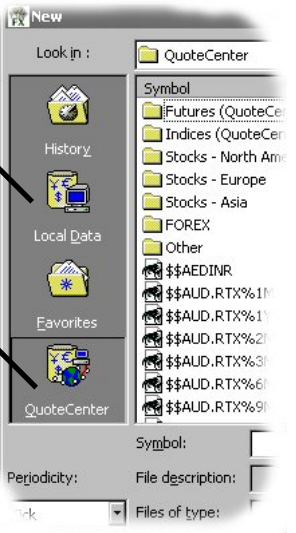
What is Data?

Before you can look at a chart, you must have data. A chart is simply a graphical representation of price data. Price data can include Open, High, Low, Close, Volume, and Open Interest information for a specific time period. MetaStock can use price data that is stored on your local hard drive, or stored remotely on a computer at your data vendor. Data that is stored remotely at your data vendor is called *online data*. Online data is accessed through MetaStock's DataOnDemand™ technology. You simply choose a symbol from the online data vendor shortcut, or if you already have a chart open, just type the symbol. The data flows instantly to your chart from your data vendor, usually through the Internet.

Data that is stored on your hard drive is called *local data*. To view local data, you must first create a security file, then collect the data through real-time collection with MetaStock Pro or end-of-day collection with The DownLoader.

Local Data.
Choose this shortcut to open a chart of locally-stored data

Online Data.
Choose this shortcut to open a chart of online data



Intraday data is based on trades as they occur throughout the day.

DataOnDemand allows you to display a chart of intraday or end-of-day data that is stored in a database on a remote computer. This information can be temporarily stored on your hard drive, but the main storage location is the remote computer at your data vendor.

Real-time data collection with MetaStock Pro allows you to view *intraday* data that is collected and stored locally on your hard drive as the trades occur.

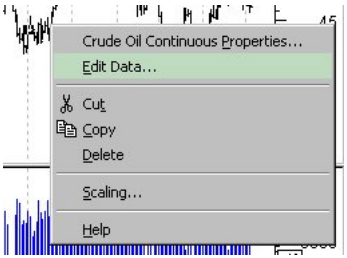
End-of-day data is based on the high, low, open, close, and volume for an entire trading day.

End-of-day data collection with The DownLoader allows you to display a chart of end-of-day data that is downloaded and stored locally on your hard drive. The goal of each of these processes is the same ↓ to retrieve data that can be displayed as a chart in MetaStock. For more information on collecting data from your data vendor, see your *Getting Started* manual.

To access the data for an open chart

To quickly access the data for an open chart,

1. Right-click on the price plot
2. Choose Edit Data from the shortcut menu.
   The security's datasheet will open in The DownLoader where you can make the desired changes.



DataOnDemand™

Online data is end-of-day or intraday data that is stored on a remote computer. You access online data through MetaStock's DataOnDemand technology by simply choosing the symbol from the Open dialog, or by typing the symbol if you already have a chart displayed. MetaStock then requests data for that security from your data vendor. The data is temporarily held in your computer's memory while you have the chart displayed. Online data can be stored in an online cache folder, much like a web browser saves web pages, for quick retrieval. See your *Getting Started* manual for online cache information specific to your data vendor.

Managing Online Securities

Because your data is stored remotely on a computer at your data vendor, you will not need to create securities or perform any file or data maintenance. If you choose to store the data temporarily on your

hard drive in the online cache, you may use that data with The Explorer or view the data in a datasheet in The DownLoader. If there is an error in the data, or a split occurs after you have stored the data in your online cache, you can re-collect the data from your vendor by choosing Refresh Data from the **View** menu while you have the chart displayed.

The DataOnDemand Collection Process

DataOnDemand occurs entirely behind the scenes. You just tell MetaStock what chart you want to display. MetaStock will get the data from your online vendor and display the chart on your screen. Your chart will then be updated as the trades occur.

If you have previously opened a chart for a security, MetaStock will first check for data stored in your online cache folder for that security, then retrieve any additional data to fill in to the current period from your data vendor. The data is then displayed in your chart.

- DataOnDemand is the quickest way to view a chart!
- With DataOnDemand, you have the entire database of securities supported by the vendor available to you instantly. You simply type a symbol and the data appears.
- DataOnDemand is only available while you are connected to your data vendor. If your connection is interrupted, or not available, you will not be able to display up-to-date charts.
- Running explorations on online data is extremely slow. If you plan to run explorations regularly, you should consider using local data instead.
- Each time you open a new online security after your cache has reached its limit, the oldest security will be removed from the cache, and the newly requested security will be added.
- Data in the online cache can be merged with local data files to create permanent securities on your hard drive.
  See *The DownLoader* manual for information on the **Merge** function.
- Because the data is primarily stored on a remote computer at your data vendor, you do not need a large amount of hard drive space for storing data.
-
  Refresh button
  If any changes are made to the data by the vendor, —for example, if a split occurs— you can quickly update the data in your online cache by choosing Refresh from the View menu or clicking the Refresh button on the Chart Toolbar while you have the chart displayed. You will not need to edit the data in the

datasheet or use any of the other file and data maintenance features in The DownLoader.

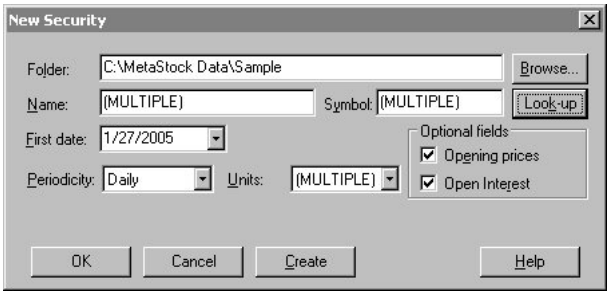
Collecting Local Real-time Data

Local real-time data is intraday data that is collected and stored on your computer as the trades occur. Before you can store local data, you must create security files for the data to be stored in. You are limited to viewing the charts for the securities you have created. If you enter a symbol in the "Choose a Security" dialog that does not have a security file created, you will be prompted to create a security file for it. The chart will then be displayed and the data will be stored.

Creating Real-time Securities

Real-time securities are stored locally on your hard drive. Once the securities have been created, they remain on your hard drive until you delete them. You are limited only by the size of your hard drive. Each local data folder can contain up to 6,000 securities, and you can have an unlimited number of folders. The MetaStock File Server updates the data in your real-time security files. As long as the File Server is running, your charts will be updated, even if MetaStock Pro has been shut down. For more information on the real-time data collection process, see page 64.

To create securities for real-time data collection, choose New, then Security from the File menu in MetaStock Professional. You may also do this in The DownLoader.



The New Security dialog also appears if you begin typing the name or ticker symbol of a security that does not already exist. As you type, the "Choose a Security" dialog appears (page 86). If the active chart contains local data, and the security or ticker symbol is not found within the "Choose a Security" dialog, the New Security dialog will appear, allowing you to create a new security. After specifying the parameters in the New Security dialog, click **OK**.

If the periodicity is set for intraday and MetaStock Pro is in real-time mode, the chart for the new security will open and begin to collect data.

Folder. Type (or use the **Browse** button to select) the folder that will contain the new security file. For information on creating new folders, see page 64.

Name. Type the name of the security. If you use the Symbol Database (see page 57), the name and symbol will automatically be filled in.

Symbol. Type the ticker symbol for the security. Click the **Look-up** button for help with ticker symbols.

First Date. This is the date that data will start to be listed from. It is disabled when you choose Intraday as the Periodicity.

Periodicity. Choose Intraday to maintain intraday price data (e.g., tick, 5-minute, hourly, etc.). For more information on periodicity, see page 121.

Units. Choose the unit format in which you would like the price data to be displayed. For example, if you choose "1/8," the portion of the price to the right of the decimal will be displayed in eighths. Only the numerator is shown; the denominator is dropped (e.g., 25 3/8 is displayed as 25 ^3). If you choose "decimal" (the default), the portion of the price to the right of the decimal will be displayed in decimal format (e.g., 25.375, 45.25, etc.).

Opening Prices/Open Interest. To track Opening Prices or Open Interest, select these boxes. Open Interest is available with most futures and options contracts.

Interval. Choose the interval from the drop-list. The interval specifies how often to update real-time charts. For example, choosing "5" causes MetaStock Pro to update the security with 5-minute bars. Once the interval has been chosen for a security, *it cannot be changed*.

A 5-minute bar labeled on a chart at 11:15 includes the first tick of 11:10:00 through the last tick of 11:14:59. Similarly, a 1-minute bar includes all ticks from 11:14:00 to 11:14:59.

Note: This option is only available when Intraday has been chosen as the Periodicity.

Start/End Times. Specify the time to begin and end collecting intraday data. Start and End times are required so that MetaStock Pro knows when to store data. They are normally set to correspond with the times the market opens and closes. Enter the Start and End times from your local time zone. If you want after-market ticks to be included in the last bar, see page 65 for the Last bar lag time option.

Browse. Click the **Browse** button to select the data folder where the new security will be created. The folder you select appears in the Folder edit box.

Look-up. Use the **Look-up** button to display the Symbol Database, which is used to quickly fill in the Name and Symbol fields with the desired security. For more information on using the Symbol Database, see page 57.

Create button

Create. Click the **Create** button repeatedly to create multiple securities without leaving the dialog. When you're done creating securities, click the **Cancel** button.

To create new local intraday securities

1. Choose New from the File menu, and select Security.
2. Complete the security attribute information in the New Security dialog. If you do not know the ticker symbol, click **Look-up**. For more information on using the Symbol Database, see page 57.

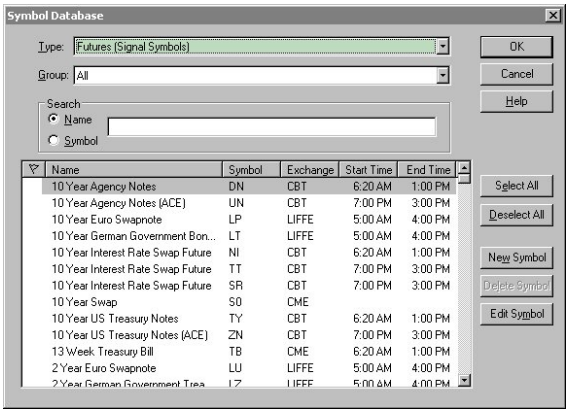
Look-up button

Note: If the security you are creating is intraday and you are running in real-time mode, the chart will immediately appear once you click the New Security dialog's **OK** button. The new security will be created in the specified data folder.

Using the Symbol Database to Create Securities

The Symbol Database provides you with instant access to ticker symbol information on thousands of securities. The database is used to place the name and ticker symbol of the selected security in the New Security dialog.

Note: The Symbol Database can also be used to quickly create multiple security files at once. The number of securities selected (i.e., highlighted) in the Symbol Database is displayed on the status bar at the bottom of the application window.



Type. Use this drop-list to choose the type of security to list (i.e., stocks, futures, etc.).

Group. Use this drop-list to control which securities are listed in the dialog. The contents of the drop-list are dependent on your selection in the Type box.

Search. Use this to search the list for the specified name or symbol.

Select All. Click this button to quickly select all securities listed.

Deselect All. Click this button to quickly deselect all securities.

New Symbol. Click this button to add a new symbol to the database.

Delete Symbol. Click this button to delete the selected symbol from the database.

Edit Symbol. Click this button to edit the properties of the selected symbol.

Tip: If you are searching for a specific security and you're not sure which exchange grouping the security belongs to, you should select the "All" group to list all securities. You can also choose from several specialized groups (i.e., S&P 100 stocks, NYSE stocks, etc.).

The group called "Optionable Stocks" lists all stocks on which options are traded.

Creating Multiple Securities with the Symbol Database

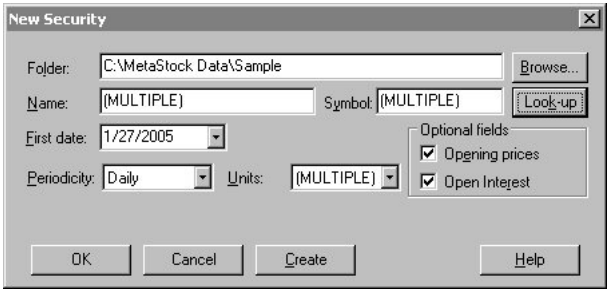
Instead of you having to create each security file individually, the Symbol Database dialog allows you to search for and select multiple files to create at once. The number of securities selected (i.e., highlighted) in the Symbol Database is displayed on the status bar at the bottom of the application window. You can even create special groupings of stocks, such as the Dow 30 stocks, S&P 100 stocks, all optionable stocks, etc.

To create multiple securities using the Symbol Database

1. Choose New from the File menu and select Security.
2. Click the **Look-up** button. The Symbol Database dialog appears.
3. Choose the Type and Group to specify the securities listed.

   Note: You can restrict the list and select individual securities by typing specific names or symbols in the Search box. Simply separate them with a caret (^) (e.g. *MSFT^IBM^AAPL^NSCP*). You can also separate each entry with a comma when looking for securities beginning with that letter, and with a caret when looking for the exact symbol. (e.g., "*A,B,C*" would list all securities beginning with the letters A, B, or C and "*A^B^C*" would list securities whose symbols are A, B, and C.).
4. Click the **Select All** button to quickly select all securities generated by the search.
   - To select a continuous group of securities, click on the first item, then hold down the SHIFT key as you click on the last item. All items between the first and last items will be selected.
   - To select multiple individual securities, hold down the CTRL key as you click on each one.
5. Click the **OK** button.

The New Security dialog will appear with the text "(MULTIPLE)" in the Name, Symbol, and Units fields. The Start time and End time fields will be blank.



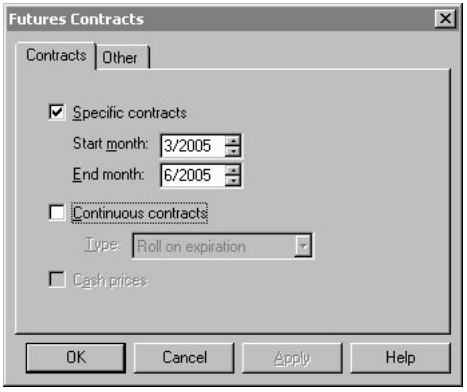
6. Verify that the remaining attributes in the New Security dialog are set correctly.
7. Click the **OK** button in the New Security dialog to create the selected securities.

Creating Futures Contracts with the Symbol Database

If you use the Reuters DataLink data service to collect your end-of-day data, you can use the Symbol Database dialog to create indices and futures (in addition to stocks and mutual funds).

If you select a Futures symbol from the Symbol Database dialog, the Futures Contracts dialog is displayed. You use this dialog to specify which contracts to create.

Use the Contracts page to control the type and date range for the contracts.

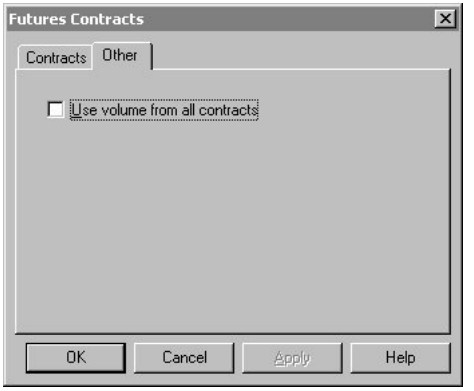


Specific contracts. Choose this box to create all contracts for the selected futures between the specified start month and end month. If

you only need to create the contracts for one month, then specify the same month for the start and end months.

Continuous contracts. Choose this box to create a continuous contract for all the selected futures contracts. A continuous contract is a special contract that automatically rolls to the next contract when the current contract expires, thereby making it "continuous."

Type. Choose the type of continuous contract. Note that the "time-weighted average" returns an average of the nearby contract and the contract with a delivery month closest to 90 days into the future.



Use volume from all contracts. Choose this box if you want the volume for all contracts to be stored. Even if you choose a specific contract month, checking this box will cause the volume to reflect the total volume for all contract months.

Updating MetaStock Data

To use the "Update MetaStock Data" feature

1. In Windows, click Start.
2. Choose All Programs.
3. Choose Equis International.
4. Choose Update MetaStock Data.
   The DownLoader opens and automatically updates all the data files in your MetaStock Data folder.

Updating the Symbol Database

The list of available symbols is updated monthly and can automatically be updated by choosing Update Symbol Database from the Tools menu in either MetaStock or The DownLoader.

The list of symbols and other commonly requested `.sym` files are also available in the Support area on the Equis International web site: http://www.equis.com.

Modifying the Symbol Database

The symbols and information in the Symbol Database can be adjusted.

To edit information for a specific symbol

Select the symbol you want to modify, and click **Edit Symbol** in the Symbol Database dialog.

To delete a symbol

Select the symbol, then click **Delete Symbol** from the Symbol Database dialog.

To add a symbol

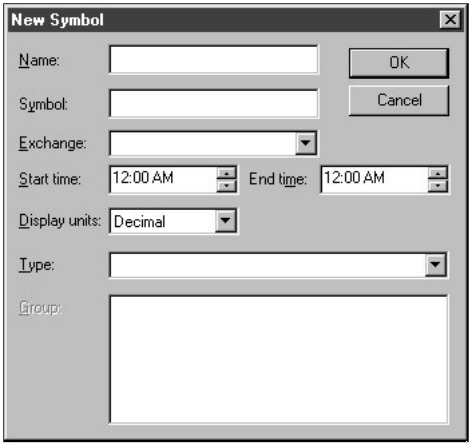
Click **New Symbol** in the Symbol Database dialog,

or

Choose New Symbol from the Tools menu in the Open dialog.

The New Symbol Dialog

To access the New Symbol dialog, click the New Symbol button in the Symbol Database dialog, or choose New Symbol from the Tools menu in the Open dialog.



Name. Type the name of the new symbol.

Symbol. Type the ticker symbol of the new symbol.

Exchange. Type the exchange code or choose from the drop-list.

Start time/End time. Specify the time to begin and end collecting intraday data when creating intraday securities.

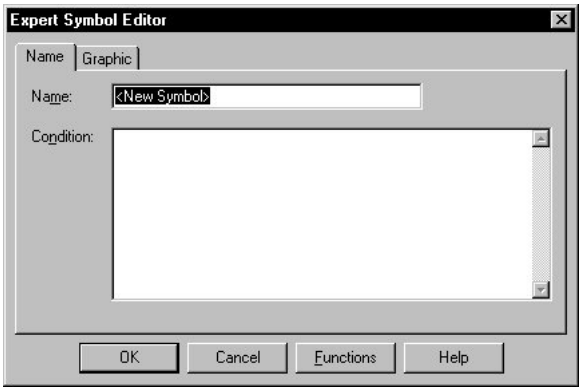
Display units. Choose the unit format in which you would like the price data to be displayed.

Type. Choose the type of symbol you are creating from the drop-list.

Group. If groups are available for the Type you have selected, you may choose a group(s) from the list provided by checking the appropriate box(es).

The Edit Symbol Dialog

To access the Edit Symbol dialog, click the Edit Symbol button in the Symbol Database dialog.



Name. Type the name of the symbol.

Symbol. Type the ticker symbol.

Exchange. Type the exchange code or choose from the drop-list.

Start time/End time. Specify the time to begin and end collecting intraday data.

Display units. Choose the new unit format in which you would like the price data to be displayed.

Type. Choose a new type from the drop-list.

Group. If groups are available for the Type you have selected, you may choose a group(s) from the list provided by checking the appropriate box(es).

Creating Custom Symbol Lists

Most people only follow a small set of instruments in their normal trading. MetaStock allows you to create and edit custom lists of symbols that are defined by you.

To create custom symbol lists for the symbol database

The Symbol Database includes nearly all U.S. and Canadian stocks and mutual funds. However, if you follow securities that do not have a universally accepted symbol format, like futures, indices, or international securities, the symbols you need may not be included in the Symbol Database. To use these types of symbols, you can create your own groups of symbols for use inside the Symbol Database dialog by creating an ASCII file with a “SYM” extension.

The Symbol Database may also be used to enter and customize large groups of securities. You may find this helpful for posting recommended lists of securities to clients or colleagues, keeping lists of securities in separate portfolios, creating custom industry groups, etc. Custom symbol groups are displayed in the Symbol Database, and when you choose the online data vendor shortcut in the Open dialog.

To create a custom symbol list

1. Open a new ASCII file in a text editor (e.g. WordPad, Notepad).
2. Type the list of securities using the following format:
   <security name>,<symbol>,<exchange>

   Example:
   ```
   Microsoft,MSFT,NASD
   Apple Computer,AAPL,NASD
   ```

   If the security name contains a comma (i.e. My Business, Inc.), the name must be surrounded by quotes (i.e. "My Business, Inc.").
   There should be no spaces before or after commas. Each individual security must be entered on a separate line in the text editor. The `<exchange>` and `<security name>` entries are completely optional. Therefore, the following format is also valid:
   <symbol>

   Example:
   ```
   MSFT
   AAPL
   ```

In the example above, the ASCII file contains only one field per line (i.e., the symbol). Since the <security name> is not provided, the Symbol Database will attempt to provide a <security name> from the existing Symbol Database. For example, since the Symbol Database associates the symbol "MSFT" to the security name "Microsoft," the name "Microsoft" will automatically be used in the <security name> field. However, if a match is not found for the <symbol> in the existing list, the symbol itself will be used in place of the <security name>.

3. Save the file with the extension ".SYM" (i.e. "`Computer.sym`"). If your text editor adds the ".TXT" extension (i.e. "`Computer.sym.txt`"), you will need to rename the file in Windows Explorer to remove the ".TXT" extension so the Symbol Database correctly recognizes the file format.
4. Place the symbol file in the same folder as the symbol database file (i.e. `C:\Program Files\Equis\Symbols`).
5. Open the Symbol Database dialog or the Open dialog. The name of the new symbol file will be displayed in the **Type** menu of the Symbol Database dialog, or in the list of available symbol types when you choose the online data vendor shortcut in the Open dialog.

Creating Data Folders for Your Security Files

MetaStock security files are stored in folders on your hard disk. You can store up to 6,000 securities in a folder, and can create an unlimited number of folders.

To create folders for your security files

1. Choose New from the File menu, and select Security.
2. Type the name of the new folder to create in the Folder box (e.g.,`c:\MetaStock Data\stocks`).
3. Fill out the remaining information in the New Security dialog, and click **OK**.

Note: You must add at least one security at this time, so that the folder will have a reason for being created.

4. Click **Yes** when asked if you want to create the folder.

The Real-time Collection Process

Real-time data collection is handled by the MetaStock File Server and the Equis Data Server. The MetaStock File Server controls the data being stored into your local security files, while the Equis Data Server actually collects the data from your data vendor.

When a new local intraday security is created and the chart opened, a request for data is sent to the Equis Data Server. As the data is

received by the Equis Data Server, it is passed to the MetaStock File Server to be stored, and to MetaStock Pro to be displayed (if the chart is open).

When a chart of an existing local security is opened, the File Server retrieves the data already stored in the security file, then the Data Server requests new data from the data vendor.

Real-time Configuration

The Real-time Configuration dialog is used to configure various functions of the data, files, data vendor, and servers.

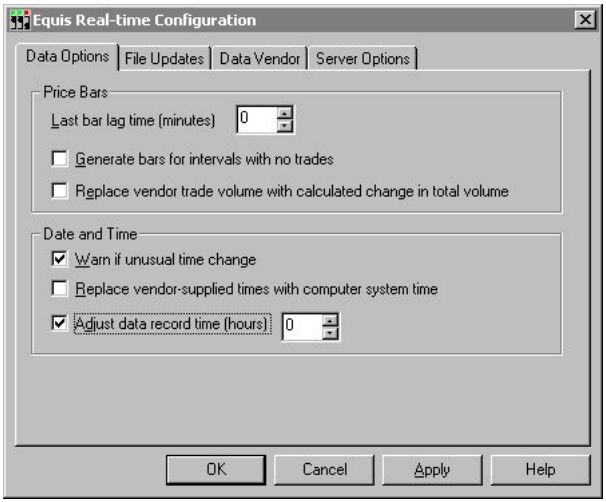
Note: Many of the configuration settings will not take effect until the Data Server and the File Server are restarted.

Equis Real-time Configuration button

The Real-time Configuration dialog is accessed by clicking the **Configure Server** button on the Real-time page in the Application Properties dialog (page 41), or by choosing the Equis Real-time Configuration application from the Equis International folder in the Windows **Start** menu.

Data Options

The Data Options page is used to adjust settings for data retrieved from the Equis Data Server.



Last bar lag time (minutes). This adjusts the lag time for the last bar of the day for all intraday securities. Normally, the last bar for the day terminates exactly at the specified end trade time (see page 55). If a lag time is in effect, the last bar will include any "late trades" beyond the ending trade time. For example, if a 5-minute security has an ending trade time at 16:00, the last bar will normally end at 16:00.

If a 3-minute lag time is in effect, the last bar will still be time stamped with 16:00, but it will also contain any ticks that arrived through 16:03. Any change to this setting takes effect immediately and does not require restarting the Equis Data Server.

Note: If the lag time goes beyond the start time for the next trading session, the last bar will be terminated at the start time of the next session.

Generate bars for intervals with no trades. If this box is checked, "flat" bars will be displayed for time intervals during which there are no trades. The last closing price will be used to generate these bars.

Replace vendor trade volume with calculated change in total volume. Check this box to display volume as the change in volume since the previously reported trade. If unchecked, the volume displayed is the volume as reported by the data vendor for the current trade.

Warn if unusual time change. If this box is checked, the Data Server will display a warning message on the screen if a large time change is detected in the data stream from your data vendor.

This warning does not necessarily indicate a problem. It may appear when the system automatically adjusts the system time according to Daylight Savings Time.

If the data vendor does not supply its own time (i.e., the computer system time is used), or if the "Replace vendor supplied time with computer system time" checkbox is checked, this warning may occur if you manually change the system time while the server is running.

A time change in the data stream should not cause any significant problems with the Data Server, but the time stamps of the records produced may be unusual.

Replace vendor supplied time with computer system time. If this box is checked, the Data Server will stamp all records with the computer system time rather than using the time provided by the vendor.

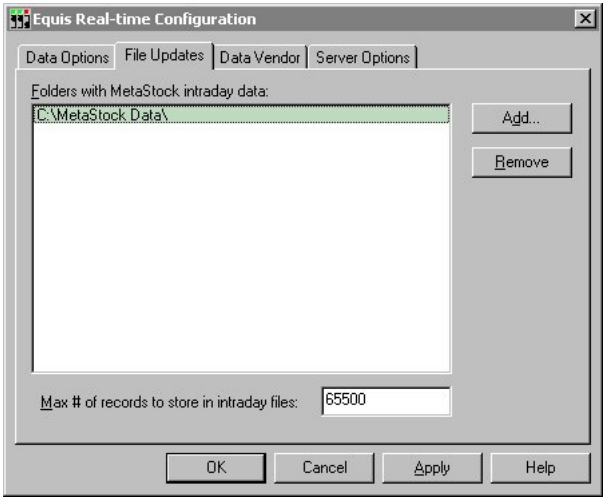
Note: If the vendor does not supply time, the computer system time is automatically used and this box will have no effect.

Adjust data record time (hours). This control allows you to adjust all time stamps on all records by a specified number of hours. This adjustment is applied to all records regardless of whether the times are supplied by the data vendor or the computer system time is used.

Note: This control does *not* affect historical records stored in your data files.

File Updates

The File Updates page controls the folders where the MetaStock File Server is maintaining local real-time data.



Folders with MetaStock intraday data. This list box shows all folders that the MetaStock File Server is currently maintaining. All intraday data files in these folders will be updated with data while the File Server application is running.

The **Add** button allows you to add a new folder to the list. If the File Server is running, it will automatically start updating the intraday files contained in the new folder. If the File Server is not currently running, it will begin updating the files in the folder when the application is started.

The **Remove** button allows you to remove a folder from the list. If the File Server is running, it will automatically stop updating all intraday securities contained in the removed folder.

While it is possible to add and remove these folders when the File Server is running, it is not suggested that this be done on a regular basis. The CPU time required by the File Server to add and remove a folder "on the fly" is significant.

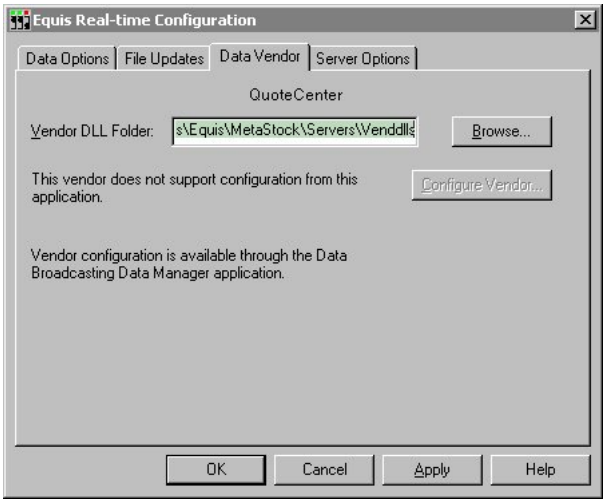
Caution: Do not attempt to access a real-time data folder that is in use by another MetaStock Pro user (i.e., a shared folder on a network). If you do, the other user will lose "write" privileges to the folder.

Max # of records to store in intraday files. The maximum number of records that MetaStock Pro can write to an intraday file is

65,500. The minimum value for this option is 5,000. If you need to conserve hard disk space or if the performance of your datasheets is poor, then you may want to lower this value. If during normal operation, this maximum value is reached, MetaStock Pro removes 10% of the oldest records to make space for the new records.

Data Vendor

This page allows you to change settings for the real-time data vendor.



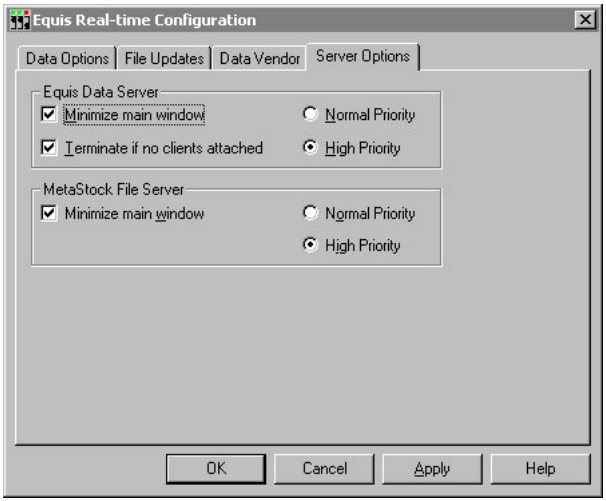
Vendor DLL Folder. All communications with a data vendor take place through the use of a special file called a DLL. Each vendor has a unique DLL to implement the data collection.

This control specifies where the vendor DLL is located. Normally, this setting is initialized during program installation and should not be changed.

Configure Vendor. If the data vendor allows access to their configuration, this button will be enabled. If you click on this button, a dialog will appear that allows you to configure specific settings within the data vendor's application itself. If the vendor does not allow access to their applications directly, this button will be disabled.

Server Options

This page allows you to change options for the Equis Data Server and MetaStock File Server applications.



Equis Data Server controls

Minimize main window. If this box is checked, the Equis Data Server application will run in a minimized state (i.e., the main window of the application will not appear on the desktop).

Terminate if no clients attached. If this box is checked, the Equis Data Server application will automatically shut itself down when it detects that there are no client applications (i.e., MetaStock Pro, File Server, etc.) currently attached. This frees system resources for other applications.

Normal Priority / High Priority. The Equis Data Server application is a multi-threaded application that runs in the background. These radio buttons allow you to change the priority of this background operation. Normally, the Data Server should run at a high priority. This ensures that the application has as much CPU time as possible to keep up with the real-time data flow from the vendor. This setting may be changed to “normal” if other applications seem to be unresponsive and if there is not a high volume of real-time data being processed. However, a “normal” priority setting can hinder the ability of the Data Server to keep up with the real-time data flow.

MetaStock File Server controls

Minimize main window. If this box is checked, the MetaStock File Server application will run in a minimized state (i.e., the main window of the application will not appear on the desktop).

Normal Priority / High Priority. The MetaStock File Server application is a multi-threaded application that runs in the background. These radio buttons allow you to change the priority of this background operation. Normally, the File Server should run at a high priority. This ensures that the application has as much CPU time as possible to keep up with the real-time data flow and to maintain the local intraday data files. This setting may be changed to "normal" if other applications seem to be unresponsive and if there is not a high volume of real-time data being processed. A "normal" priority setting can hinder the ability of the File Server to keep up with the real-time data flow.

Things to Know about the Equis Servers

You should not be concerned with the operation of the Equis Data Server and File Server applications. In fact, you may never even need to see them. These programs do the "behind the scenes" work.

Equis Data Server icon

If you prefer that the taskbar not show the buttons for the Data Server and File Server, right-click on the buttons and choose Minimize. Once minimized, you can click on their icons on the right side of the taskbar to switch back.

MetaStock File Server icon

The majority of the options in the menus of the Equis Data Server and File Server are standard controls and need no explanation. However, the following provides a brief explanation of a few options in the View menu that do require additional explanation.

If you exit MetaStock Professional while the File Server is collecting data, a message box appears asking if you want to shut down the File Server. To continue to collect real-time data after shutting down MetaStock Professional, click **No**. Once the File Server has been closed, the Data Server will shut down also.

Performance Statistics

Performance Statistics button

The Statistics dialogs of the Data Server and File Server are accessed by choosing Performance Statistics from the View menu or clicking the Performance Statistics button on the toolbar.

The Performance pages of the File Server's and Data Server's Statistics dialog provide feedback on the efficiency of the flow of real-time data. The Efficiency area at the bottom of the Statistics page is worth noting. It shows the current and minimum amount of idle time. If these values get too low, warnings may start popping up on your screen complaining about MetaStock Pro's inability to keep up. To remedy this, you may need to reduce the number of real-time securities you follow, or upgrade your computer's resources (i.e., RAM, CPU, hard disk).

Cache

The Cache page of the File Server Statistics dialog shows the total real-time securities being processed, the current cache size (in RAM), and the amount of this cache being used. The cache temporarily holds the real-time data as it waits to be sent to the appropriate data files. The cache size will automatically increase/decrease (up to 2 MB) as needed to accommodate the flow of real-time data.

Controlling the Message Levels

As the Data Server and File Server process the incoming real-time data, a running log of informative messages is maintained in the window. To control the amount of detail to display, choose from one of three options in the View menu: Critical Messages Only, Standard and Critical Messages (*default*), Diagnostic, Standard, and Critical Messages.

Important Facts About Real-time Data

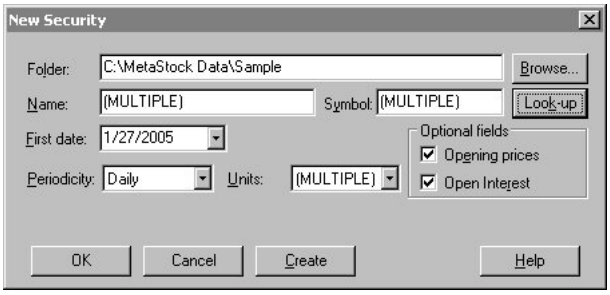
- Real-time data collection provides data as the trades occur. You do not need to wait until the end of the day to get your data. For active day-traders, this is a necessity.
- Intraday data collected through real-time data collection is stored locally on your hard drive. The data can require a significant amount of hard drive space, depending on how many securities you are following and what periodicity you prefer. You will need more room on your hard drive for data if you prefer tick data over hourly data, for example.
- Because local intraday data is stored on your computer, it can be used for your analysis anytime you need it. For example, you can collect prices all day, take your laptop with you when you leave the office, and do your analysis after market hours.
- You can also use local intraday data in other software that is OLE compatible (page 12).
- MetaStock Professional cannot collect history for local intraday securities. Your history begins when you first create the security file. To view historical intraday data, use DataOnDemand. (See page 52.)

End-of-day Data Collection with The DownLoader

Downloaded data is stored locally on your hard drive. You must create security files and download data before opening a chart. Once the data has been collected, it can be used with any of MetaStock's advanced analysis tools. The DownLoader is used to collect data from one of several end-of-day data vendors, and for more comprehensive data maintenance such as editing, merging, deleting, and sorting security files.

Creating Local End-of-day Securities

Security files are created using the New Security dialog. You can do this in either MetaStock or The DownLoader. The New Security dialog is accessed by choosing New from the File menu, then selecting Security.



The New Security dialog also appears if you begin typing the name or ticker symbol of a security that does not already exist. As you type, the "Choose a Security" dialog appears (page 86). If the active chart contains local data, and the security or ticker symbol is not found within the "Choose a Security" dialog, the New Security dialog will appear, allowing you to create a new security.
After specifying the parameters in the New Security dialog, click the **OK** button. You will then need to download the data for that security using The DownLoader.

Folder. Type (or use the **Browse** button to select) the folder that will contain the new security file. For information on creating new folders, see page 64.

Name. Type the name of the security. If you use the Symbol Database (see page 57), the name and symbol will automatically be filled in.

Symbol. Type the ticker symbol for the security. Click the **Look-up** button for help with ticker symbols.

First Date. Enter the first date for which you want to collect data. Note that you can enter the year using two or four digits (i.e., 05 or 2005). You specify the last date to collect at the time of data collection.

Units. Choose the unit format in which you would like the price data to be displayed. For example, if you choose "1/8," the portion of the price to the right of the decimal will be displayed in eighths. Only the numerator is shown; the denominator is dropped (e.g., 25 3/8 is displayed as 25 ^3). If you choose "decimal" (the default), the portion of the price to the right of the decimal will be displayed in decimal format (e.g., 25.375, 45.25, etc.).

Opening Prices/Open Interest. To track the Opening Prices or Open Interest, select these boxes.

Open interest is available with most futures and option contracts.

Browse button

Browse. Click the **Browse** button to select the data folder where the new security will be created. The folder you select appears in the Folder edit box.

Look-up button

Look-up. Use the **Look-up** button to display the Symbol Database, which is used to quickly fill in the Name and Symbol fields with the desired security. For more information on using the Symbol Database, see page 57.

Periodicity. Choose the desired periodicity for the security.

- Choose Daily if you want to maintain price data for each day that the security trades.
- Choose Weekly if you want to maintain price data for the security on a weekly basis (Friday to Friday).
- Choose Monthly if you want to maintain price data for the security on a monthly basis (month-end to month-end).

For information on adding intraday securities, see page 56.
For more information on periodicity, see page 121.

Create button

Create. Click the **Create** button repeatedly to create multiple securities without leaving the dialog. When you're finished creating securities, click the **Cancel** button.

To edit local securities

1. Right-click on the price bar that needs to be edited.
2. Choose Edit Data from the shortcut menu.
3. Enter the desired changes.
4. Choose Save from the File menu.

If a chart for a security is open, any change made in The DownLoader to that security's attributes (e.g., name, ticker, units, etc.) will not be immediately reflected in the open chart.

The chart must be closed and then reopened to reflect the changes. However, changes made to the pricing data itself (i.e., date, open, high, low, close, etc.) will be immediately reflected in the open chart.

To create new local end-of-day securities

1. Choose New from the File menu, and select Security.
2. Complete the security attribute information in the New Security dialog. If you do not know the ticker symbol, click the **Look-up** button. For more information on using the Symbol Database, see page 57.
3. Collect data for this security by choosing Download Prices from the Tools menu in The DownLoader.

Maintaining Local Securities with The DownLoader

All file and data maintenance functions are found in The DownLoader. The DownLoader is a separate program provided with MetaStock.

The DownLoader icon

You can run The DownLoader using the Windows **Start** command by going to the Equis International folder and choosing The DownLoader. You can also run The DownLoader directly from within MetaStock by choosing **Tools>** The DownLoader.

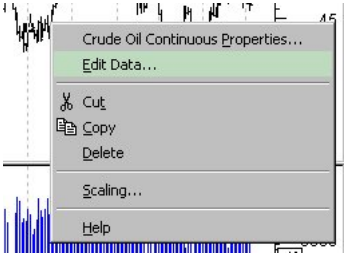
There are many unique functions that The DownLoader can perform:

- You can create and edit MetaStock security files using The DownLoader's datasheets.
- You can update your local end-of-day security files from an end-of-day data vendor.
- You can convert security files from one format to another.
- You can test the integrity of your security files.
- You can sort securities or the securities' data.
- You can merge securities.
- You can delete securities or a range of data within the files.
- You can copy and move your securities from one folder to another.

The folder where The DownLoader program is located is specified in the Application Properties dialog (page 41). This specified folder must be correct in order for The DownLoader to run successfully from within MetaStock.

To quickly access the data for an open chart, right-click on the price plot and choose Edit Data from the shortcut menu. The security's

datasheet will open in The DownLoader where you can make the desired changes.



To edit end-of-day securities

1. Right-click on the price bar that needs to be edited.
2. Choose Edit Data from the shortcut menu.
3. Enter the desired changes.
4. Choose Save from the File menu.

If a chart for a security is open, any change made in The DownLoader to that security's attributes (e.g., name, ticker, units, etc.) will not be immediately reflected in the open chart. The chart must be closed and then reopened to reflect the changes. However, changes made to the pricing data itself (i.e., date, open, high, low, close, etc.) will be immediately reflected in the open chart.

The DownLoader's Collection Process

You use The DownLoader to collect data for end-of-day local securities. To connect to your end-of-day data vendor, choose Download Prices from the Tools menu in The DownLoader. See The DownLoader's Help file for more information.

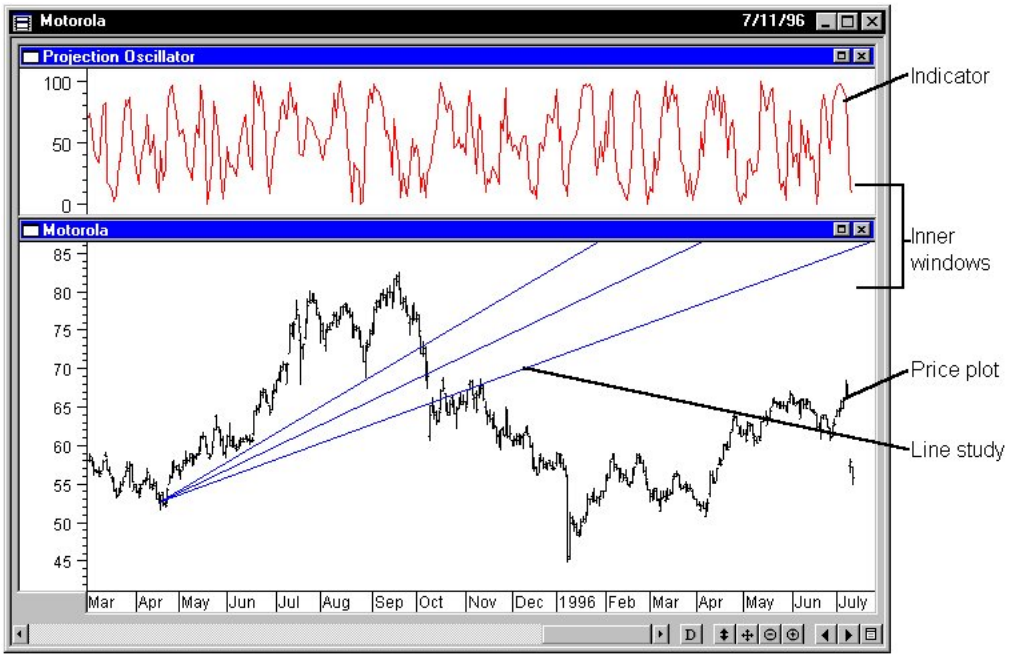
Important Facts About Downloading

- The DownLoader can collect only end-of-day data. End-of-day data includes Daily, Weekly, and Monthly prices.
- The data for the current trading day is not available until after the market closes.
- All of the data is stored on your local hard drive, which takes up a significant amount of space.
- You only have to be connected to your vendor for downloading for a short amount of time.

Saving Your Work with Charts

What is a Chart?

A chart is the focal point of much of what you do in MetaStock. A chart is a graphical representation of security prices along with any accompanying indicators and line studies. In MetaStock, a chart is contained within a single window. The window is divided into one or more *inner windows* where the prices and indicators are plotted.



A chart helps you perform a visual interpretation of a security. Indicators can be plotted on a chart to help you see what prices have done in the past, what they are currently doing, and what they may do in the future (page 237). Line studies can be drawn on a chart to see how prices (and indicators) react at certain price levels or time intervals (page 185).

The Convenience of Smart Charts™

To help with the management of your charts, MetaStock automatically creates for every security a special type of chart called a Smart Chart. A Smart Chart is simply a chart that is automatically saved under the security's name each time you are done working with it. The next time you load a security's Smart Chart, it appears exactly as it did when you last saw it. This frees you from having to worry about saving your charts using the more involved (but more flexible) Save As command (page 98).

Smart Charts appear in the Open dialog. Choose Smart Charts from the Files of Type drop-list to display the Smart Charts. MetaStock maintains one Smart Chart per security. If you have not yet opened the Smart Chart for a security, a special template called DEFAULT.MWT (page 151) is used to determine how your Smart Chart will look initially. You may then make the necessary changes which will be saved automatically.

You may find that you only need to see one chart of a security. If this is the case, then Smart Charts will be a great convenience for you. However, if you'd like the flexibility of having multiple charts per security, then use the Save As command (page 98) to assign a name to each chart.

If you want to save a Smart Chart under a unique filename, choose Save As from the File menu. Specify the file type as "Chart."

To access Smart Charts from read-only media

In order for a Smart Chart and its information (e.g., trendlines, indicators, moving averages, etc.) to be saved, you must be able to write to the disk on which the data is located. If you are accessing data from a read-only disk (e.g., CD-ROM, network drive, etc.), changes to Smart Charts cannot be saved. If you need to save the changes, you can save the chart as a Chart file using the Save As command (page 98).

Creating a New Chart

New button

A new chart is created by using the New command in the File menu. When a new chart is created and displayed on the screen, a special default template called DEFAULT.MWT is automatically used to determine how the initial chart will appear. For more information on the default template, see page 151.

You can apply a custom template to a new chart at the time you are creating the chart by choosing the **Template** button in the New dialog. For more information on Templates, see page 147.

The name of a chart appears in the chart's title bar. Newly created charts are assigned a default name of "CHART*x*.MWC" where "*x*" is a number corresponding to the number of unnamed charts opened.

If you attempt to close or save a chart that has a default "CHART*x*" name, the Save dialog (page 98) will appear prompting you to provide the chart a customized name (if desired).

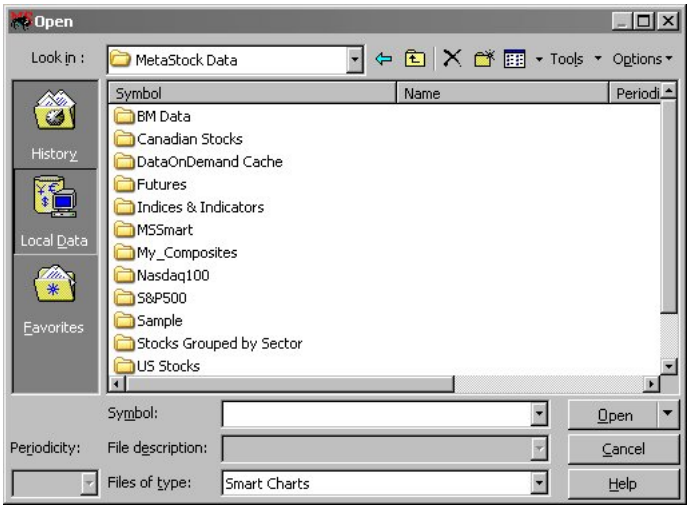
To create a chart

1. Choose New from the File menu. Choose Chart.
2. From the Look in box, select the folder where the security you want to chart is located.
3. Double-click the name of the security you want to chart.

Displaying Existing Charts

Open button

After a chart is saved (either manually by you or automatically as a Smart Chart), it can be redisplayed by using the Open command in the File menu.



Use the Files of Type drop-list to choose Charts or Smart Charts to display in the list. If the chart or Smart Chart you want to open is not listed, make sure the correct folder is chosen in the Look in box.

To select multiple charts, hold the SHIFT *or* CTRL *keys down as you click.*

If you want to open multiple charts at once, you can select multiple charts from the list in the Open dialog and click the **OK** button. Each chart you select will be opened.

If you click on a chart's name, a description of the chart (if one was entered) is displayed in the Description box.

You can also filter the securities displayed in the Open dialog. For information on filtering securities in this dialog, see page 96.

If displaying the securities in the Open dialog is too slow, you may want to reduce the number of securities in the folder. Although a folder can hold up to 6,000 securities, anything over 1,000 may cause the Open dialog to display very slowly on some computers.

You can apply a custom template to a Smart Chart by choosing Open with Template from the Options menu. For more information on Templates, see page 147.

If you attempt to open a chart or Smart Chart that is already open, the open chart or Smart Chart is selected. If you need to make a "clone" of an open chart, use the New Window command in the Window menu (page 89).

To open an existing chart

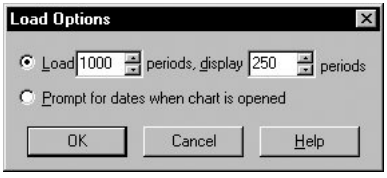
1. Choose Open from the File menu.
2. From the Files of Type drop-list, select either Charts or Smart Charts, depending on the type of chart you want to open.
3. If you chose Smart Charts, you can also apply a template (if desired) by choosing Open with Template from the Options menu.
4. From the Look in box or Shortcut Bar, select the folder where the chart you want to display is located.
5. Double-click the name of the chart you want to display.

To quickly open multiple charts

1. Choose Open from the File menu.
2. From the Files of Type drop-list, select either Charts or Smart Charts, depending on the type of chart you want to open. If you chose Smart Charts, you can also apply a template to each of the charts (if desired) by choosing Open with Template from the Options menu.
3. From the Look in box or Shortcut Bar, select the folder where the charts you want to display are located.
4. Select multiple charts by holding down the CTRL key as you click the mouse.
5. Click the **Open** button.

Controlling the Number of Periods Loaded

You can control how many periods of data are loaded and displayed by choosing Load Options from the Options menu in the New or Open dialogs. Up to 65,500 periods (i.e., days, weeks, months, etc.) of data can be loaded and displayed in a chart.



Load [ ] periods display [ ] periods. Enter the number of periods to load and display.

Prompt for dates when chart is opened. Select this if you want to specify the amount of data loaded each time a chart is opened.

Specifying the Date Range When Loading

If you choose the Prompt for dates when chart is opened option in the Load Options dialog, MetaStock will prompt you for the amount of data to load each time a chart is created or opened. This is useful to view different ranges of data for different charts.

The periods displayed in the Last __ time periods box defaults to the last number entered. Note that the dates displayed in the First Date and Last Date boxes correspond to first and last dates available in the data file.

To specify the date range when loading

1. Choose **File>** New (or Open).
2. Choose **Options>** Load Options.
3. Select Prompt for dates when chart is opened.
4. Click **OK**.
5. Select the security (or chart) you want to load.
   The Date Range dialog will appear prompting you for the range of data to load.

Identifying Composite Securities

A composite is a special security type that links two securities together with a mathematical operator. Composite securities are created with The DownLoader. For more information on composite securities, see page 675.

Composite security icon

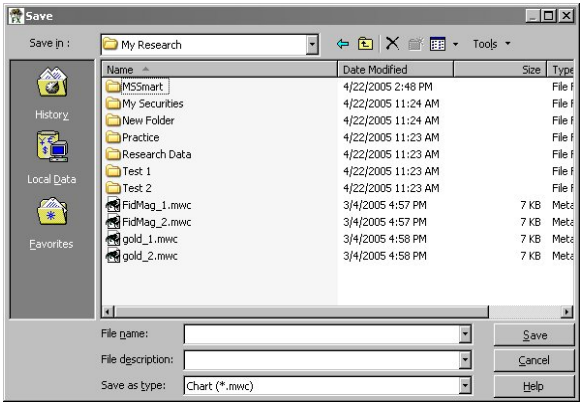
Composite securities are easily identified from the Open and New dialogs by a special icon to the left of the security's name.

Saving Charts

When you open a chart, MetaStock copies it from your disk to the screen. Changes made to charts are temporarily stored in memory until you save them to the disk.

Save button

Charts are saved using the Save and Save As commands in the File menu. MetaStock also has an automatic saving feature called Smart Charts. If you open a Smart Chart, the changes you make are automatically saved when the chart is closed (For more information on Smart Charts, see page 98).



If you use the Save command to save a chart and the selected chart is unnamed, the Save dialog will appear prompting you to provide a name. If you attempt to close a chart to which you have made changes, you will be asked if you want to save the chart.

We recommend that you save your charts often when making extensive changes so that you avoid losing your work due to power outages or other unplanned events.

Although a Smart Chart is automatically maintained for every security, there may be times when you want a specific “chart” to replace the security’s automatically-created Smart Chart. Choose Smart Charts as the Save as type if you want the selected “chart” to replace the underlying security’s Smart Chart.

To save a chart

1. Select the chart you want to save by clicking directly on the chart.
2. Choose **File>** Save. If the chart is new and unnamed, you will be prompted to supply a name in the Save dialog (see page 98).

Closing Charts

After you finish working on a chart, you should close it to free memory. If you attempt to close a chart to which you have made changes, MetaStock will ask you if you want to save the chart first. If you attempt to close a chart that has never been saved before (e.g., a newly created chart), MetaStock displays the Save dialog which prompts you to provide the chart a name.

To close a chart

1. Select the chart you want to close and do one of the following:
   - Choose **File>** Close.
   - Click the Close button in the upper-right corner of the chart.
   - Double-click the chart's system box in the upper-left corner of the chart.
2. If the chart has been changed, you are asked if you want to save it. If the chart is unnamed, you are prompted to provide a name.

Close button

System box

To close all open charts

1. Choose **File>** Close All.
2. If any chart has been changed, you are asked if you want to save it. If any chart is unnamed, you are prompted to provide a name.

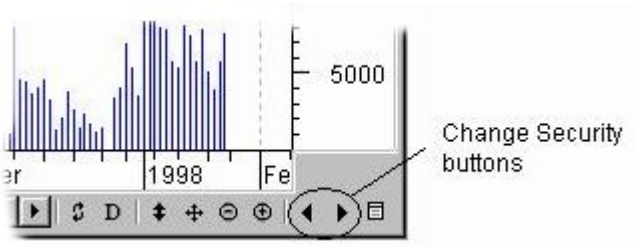
Scanning Charts with the Change Security Commands

A quick way to scan all the securities in a folder is with the Change Security commands. The Change Security commands replace the base security of the selected chart or layout with the next (or previous) security in the folder. All indicators are recalculated (using the same parameters) on the new base security. Everything else about the chart or layout remains intact.

There are four ways to access the Change Security commands.

- You can choose **File>** Change Security.
- If you have a scrollable pointing device (such as the Microsoft IntelliMouse™), you can use the scroll feature. While holding the ALT key down, rotate the scrollwheel (or its equivalent) forward to move to the next security or rotate it backward (toward you) to move to the previous security. For more information on using a scrolling pointing device, see page 35.
- You can use the ALT+RIGHT ARROW key combination to move to the next security or ALT+LEFT ARROW to move to the previous security.

- You can click the **Next Security** or **Previous Security** buttons on the Chart toolbar (page 29).



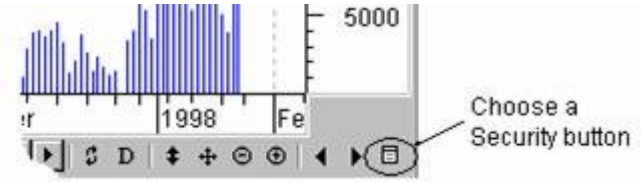
This feature can be a great time saver, particularly for those who like to look at all their securities with the same set of indicators. If you are in the middle of scanning through securities, any changes made to a chart are reflected in all charts that you subsequently scan to. Smart Charts are unaffected unless you make changes to a chart. If changes are made to the displayed security, the security's Smart Chart will be overwritten.

To scan through charts

1. Display a chart that you'd like to use as the base chart when scanning.
2. Do one of the following:
   - Choose **File>** Change Security, then click **Next**.
   - Type ALT+RIGHT ARROW
   - Click the **Next Security** or **Previous Security** button on the Chart toolbar.

Choose a Security

If you like the idea of scanning charts, but don't want to sequentially advance through every security in the folder, you can use the "Choose a Security" dialog.



This dialog allows you to select a security from a list. The simplest way to access this dialog is to simply type the name or ticker symbol while a chart is displayed. If you type the name, make sure the By Name option is selected (or the By Symbol option if typing a ticker symbol). As you type, the "Choose a Security" dialog automatically appears and advances to the security's name or ticker symbol. Press the ENTER key or click the **OK** button to display the chart.

If you type a name or symbol that does not exist in your security files, the "Choose a Security" dialog will appear with no match. Press the ENTER key or click the **OK** button and the New Security dialog automatically appears and allows you to create a new security. For more information on adding new securities, see page 74.

There are three ways to access the "Choose a Security" dialog.

- Choose **File>** Choose Security.
- Click the **Choose Security** button on the Chart toolbar (page 29).
- With a chart displayed, begin typing a security's name. As you type, the "Choose a Security" dialog will automatically appear.

Options for Scanning Charts

The Change Security options can be accessed by choosing the Options tab in the Choose Security dialog.

Use Smart Charts. Choose this option to display a security's own Smart Chart when scanning. For more information, see page 44.

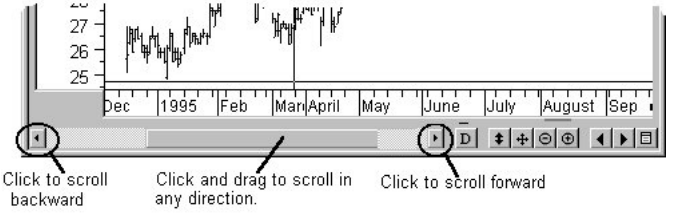
Use Chart as Template. Choose this option to scan charts with the same information (i.e., indicators, periodicity, etc.). For more information, see page 44.

Keep Line Studies. Check this box to transfer line studies from one chart to the next when scanning. For more information, see page 44.

Change All Charts in a Layout. Mark this box to scan your charts using a multi-chart template or layout. For more information, see page 44.

Scrolling Charts

A horizontal scroll bar is located at the bottom of every chart. This scroll bar lets you move forward and backward through the loaded data. Click the left scroll button to scroll backward through the data, and click the right scroll button to scroll forward through the data. You can also click and drag the scroller to move in either direction.

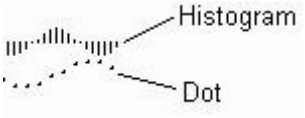


To scroll your data, you must have more data loaded than displayed. You can use the Load Options dialog (page 81), the X-Axis properties dialog (page 119), or the Zoom In command (page 131) to reduce the amount of data displayed versus the amount loaded.

If you have a scrollable pointing device (such as the Microsoft IntelliMouse), you can use the scroll feature. While holding the ALT key down, rotate the scrollwheel (or its equivalent) forward to move forward in the data or rotate it backwards to move backward in the data. For more information on using a scrollable pointing device, see page 35.

Learn as You Plot

You can scroll a chart by only a single time period (i.e., day, week, or month) by holding down the SHIFT key when clicking on a chart's horizontal scroll buttons. This can be useful if you want to do what we call "learn as you plot." By analyzing a chart and then scrolling a chart forward one period at a time, thereby simulating the passing of time, you can quickly improve your technical analysis skills.



It is helpful to use the histogram or dot as your indicator style when using learn as you plot. If you use a standard line style, you will be able to see the direction the indicator is moving before you scroll to the next period.

To automatically scroll through a chart, you can also use the Microsoft IntelliMouse pointing device. For more information on using a scrollable pointing device, see page 35.

Rescale Y-Axis

Rescale Y-axis button

The **Rescale Y-Axis** button is used to manually force the y-axis to rescale. This tool is primarily used when you are using the chart's scroll bar to scroll through the data. Choose this command from the **View** menu or from the Chart toolbar.

When scrolling forward or backward through a chart, the y-axis scale remains fixed (unless the Scroll Rescales Y-Axis checkbox in the Application Properties dialog is checked; see page 41 for more information). However, the data being scrolled may oscillate up and down. Very often, the data moves outside the fixed range of the y-axis scale. When this occurs, use the Rescale Y-axis command to rescale the chart so that the data comes into complete view.

Cloning Charts

The New Window command in the Window menu is used to create a copy (i.e., clone) of the selected chart. For example, if you have a chart named "IBM" selected, and you choose the New Window command, another chart will open containing the same data and plots. The new chart will be unnamed with the title "Chart1-IBM."

This command is useful for quickly designing a layout or template that requires multiple charts of the same security.

To clone a chart

1. Select the desired chart by clicking anywhere on it.
2. Choose **Window>** New> Window.
   The existing chart will be cloned into the new window.

Chart Concepts

Managing Your Charting

MetaStock provides three ways to manage your charting using charts, Smart Charts™, and layouts. All three file types are managed from one central location, the **File** menu.

Charts

A "chart" is a graphical representation of a security in a single window. A chart can contain price plots, indicators, line studies, text, etc. in one or multiple inner windows. You can create a chart by choosing **File>** New> Chart from the menu. To save a chart, choose Save As from the File menu, then provide a unique file name using the `*.mwc` extension. For more information on charts, see page 77.

Smart Charts

A "Smart Chart" is a chart that is saved with the security name. You do not need to provide a file name. The changes are saved automatically when you close the Smart Chart. To open a Smart Chart, choose **File>** Open. The first time you open a Smart Chart, a special template is used, called `DEFAULT.MWT` (described on page 151), to display the price information.

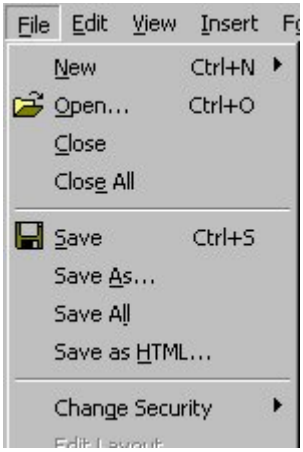
Layouts

A "layout" is a graphical representation of one or multiple securities in one or multiple windows. A layout can contain price plots, line studies, text, etc.

With a layout, you can group charts of the same or different securities into one manageable unit. For example, perhaps you'd like to see charts of all of your computer stocks on the screen ↓ not just today, but every day. You could load them all, display them as you'd like, and then save them in a layout for later use using an `*.mwl` extension. Or maybe you always like to display Corn and Wheat charts with a 14-day Stochastic, 9-day RSI, and 10-day moving average. Again, use a layout. For more information on layouts, see page 135.

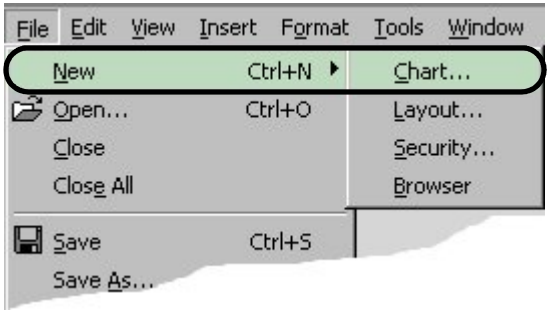
Opening, Closing and Saving (General)

This section explains the controls in the common Windows dialogs used to open, close, and save files. These commands are found in the File menu.

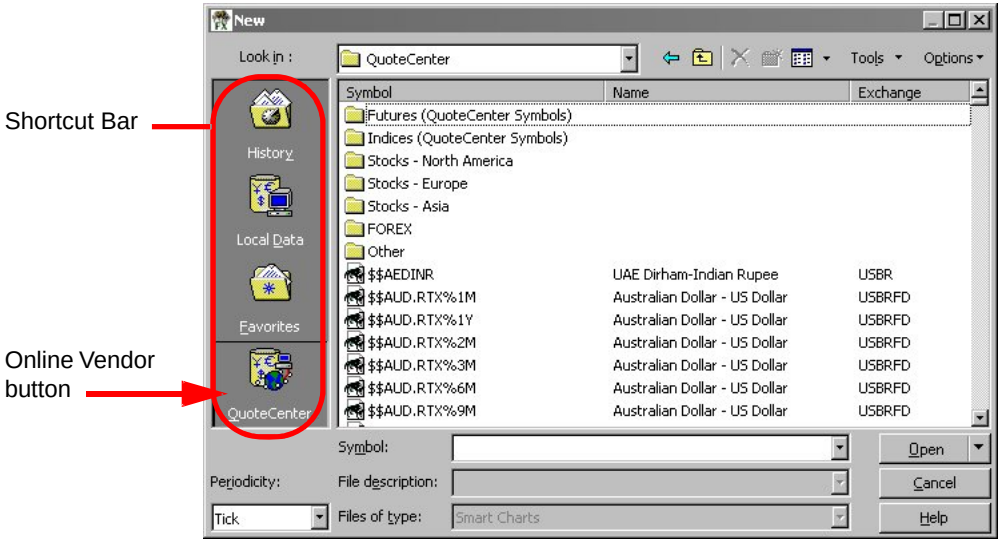


New Chart

The New dialog is used to create a new chart.
Choose **File>** New> Chart.



This opens the **New** dialog:



History. Choose the History shortcut from the Shortcut Bar to create a new chart for a security you have recently accessed. You can adjust the size of the history by choosing Limit History Items from the Open dialog's Tools menu.

Local Data. Choose the Local Data shortcut from the Shortcut Bar to create a new chart for a security located on a local disk drive. The local data folder from which you last viewed a security is displayed.

Favorites. Choose the Favorites shortcut from the Shortcut Bar to create a new chart for one of your predefined favorite securities. To add an item to Favorites, choose Add to Favorites from the Open dialog's Tools menu. For more information on favorites, see page 562.

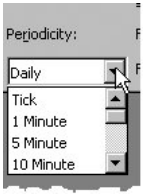
<Online Data Vendor>. If you are using an online data vendor, you may select from a list of securities available from your vendor by choosing this shortcut from the Shortcut Bar.

Look in. Use this drop-list to select the folder that contains the security for which you want to create a chart. Scroll through the folders until the desired folder is listed.

Security / Symbol. The security you select from the list appears in this box. This is the security for which a new chart will be created. You can select multiple securities by holding down the SHIFT or CTRL key as you make your selections. A new chart will be created for each selected security. For information on filtering securities in this dialog, see page 96.

Files of type. This is disabled since charts are always saved with a `*.mwc` extension.

Periodicity. Choose the desired periodicity from the drop list.



Note: This is only available when creating a chart for an *online* security.

For more information on periodicity, see page 121

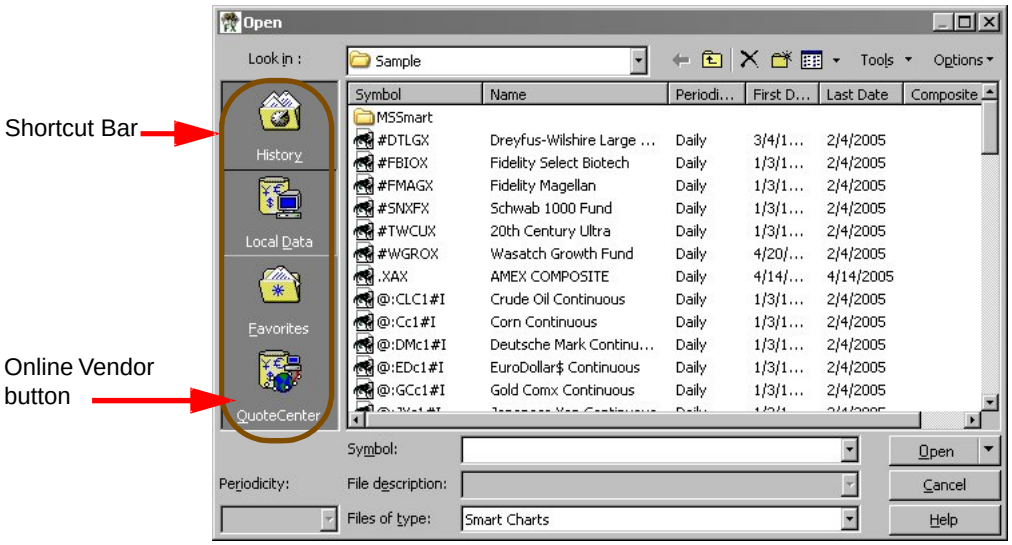
File Description. Enter a description of the new chart.

- For more information on creating charts, see page 93.
- For more information on the Shortcut Bar and menus found in the New dialog, see page 100.

Open button

Open Dialog

The Open dialog is used to open Smart Charts, existing charts, and layouts. Choose **File>** Open.



History. Choose the History shortcut from the Shortcut Bar to select from the list of securities you have most recently accessed. You can adjust the size of the history by choosing **Tools>** Limit History Items.

Local Data. Choose the Local Data shortcut from the Shortcut Bar to open an existing Smart Chart located on a local disk drive. The local data folder from which you last viewed a security is displayed.

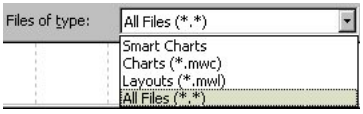
Favorites. Choose the Favorites shortcut from the Shortcut Bar to choose from your list of predefined favorite securities, charts, and layouts. To add an item to Favorites, choose **Tools>** Add to Favorites from the menu. For more information on favorites, see page 562.

<Online Data Vendor>. If you are using the online data vendor, you may select from a list of securities available from your vendor by choosing this shortcut from the Shortcut Bar.

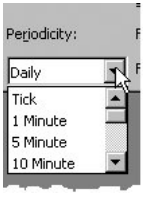
Look in. Use the drop-list to select the folder that contains the desired Smart Chart, chart, or layout. Scroll through the folders until the desired folder is listed.

Security / Symbol / File Name. The chart or layout you select from the underlying list appears in this box. This is the chart or layout that will be opened. You can select multiple charts or layouts to open by holding down the SHIFT or CTRL key as you make your selections. For information on filtering securities in this dialog, see page 96.

Files of type. Choose the type of files (i.e., Smart Charts, charts, or layouts) you want to display in the list. The last folder you opened that type of file from will be displayed.



Periodicity. Choose the desired periodicity from the drop list. This option is available only when opening an *online* security.



For more information on periodicity, see page 121

File Description. Enter a description of the chart or layout.

For more information on displaying existing charts, see page 81.
For more information on displaying existing layouts, see page 137.
For more information on the Shortcut Bar and menus found in the Open dialog, see page 100.

Filtering Securities in the Open and New Dialogs

MetaStock allows you to filter the securities displayed in the Open and New dialogs.

For online securities:

To filter **online** securities displayed in the Open and New dialogs, begin typing the name or symbol in the Security name / Symbol box. As you type, the list is filtered.

To search for multiple securities, separate each entry with a comma when looking for securities beginning with that letter, and with a caret (^) when looking for the exact symbol. (e.g., "*A, B, C*" will list all securities beginning with the letters A, B, or C and "*A^B^C*" will list securities whose symbols are A, B, and C.)

For local securities:

To filter **local** securities displayed in the Open and New dialogs type the security name or part of a security name in the Security box and press the ENTER key. The wildcard characters * and ? can be used as shown below.

- *B** Securities that begin with the letter "B" are displayed.
- **B* Securities that end with the letter "B" are displayed.

- *B?* Securities that begin with the letter "B" and are followed by only one other character are displayed.

To reset the list to display all securities, delete all characters in the Security box and press the ENTER key.

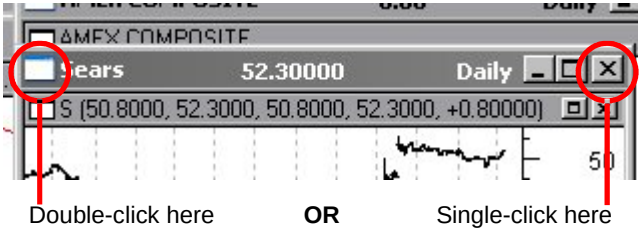
To search for multiple securities, separate each entry with a comma when looking for securities beginning with that letter, and with a caret (^) to open the chart with the exact symbol. (e.g., "*A*, B*, C**" would list all securities beginning with the letters A, B, or C and "*A^B^C*" would open securities whose symbols are A, B, and C.)

Close and Close All Commands

Choose the Close command from the File menu to close the selected chart or layout. Choose the Close All command from the File menu to close all open charts and layouts. If any changes were made to the chart or layout, you will be asked if you want to save the changes.

Close button

You can also close a chart by double-clicking the system box at the top left corner of the chart.



References: For information on closing charts, see page 84.
For information on closing layouts, see page 143.

Save Command

The Save command is used to save charts and layouts. When you open a chart or layout, MetaStock copies it from your disk to the screen. Changes made to charts are temporarily stored in memory until you save them to the disk.

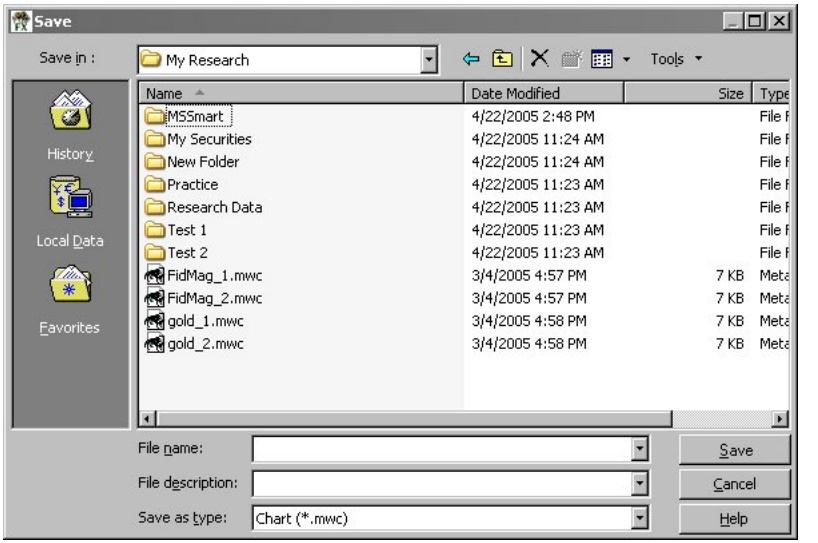
Choose Save from the File menu. If the selected chart or layout is unnamed, the Save As dialog will appear, prompting you to provide a name. We recommend that you use the Save command when you are in the middle of making extensive changes so that you avoid losing your work due to power outages or other unplanned events.

References: For information on saving charts, see page 83.
For information on saving layouts, see page 141.

Save Dialog (and Save As Command)

The Save dialog is used to save a chart, layout, or template to a file name that you provide. Choose Save As from the File menu. If you attempt to close a chart or layout that you have made changes to, MetaStock will automatically ask you if you want to save the chart.

For information on saving a chart as an HTML file, see page 634.



Save in. Use the drop-list to select the folder where the file is to be saved. If you have selected Smart Chart from the Save As Type list, the tree is disabled and the chart is automatically saved with the security data file.

File Name. Type the name you want to assign to the file. The name of the selected chart, layout, or template is displayed in the File Name box. You can save it to its existing path and name or you can specify a new one. Charts are given a `*.mwc` file extension, layouts `*.mwl`, and templates `*.mwt`. If you selected Smart Chart from the Save As Type list, the File Name box is disabled, as Smart Charts are automatically assigned a name.

File Description. Enter a description of the file.

Save As Type. Choose the type of file you want to save.

- Choose Chart if you want to save the selected chart to a file name.
- Choose Template if you want to save a template based on the selected chart's contents.
- Choose Smart Chart if you want to save the selected chart as this security's Smart Chart.

Saving charts in different formats

- To save charts as a layout, first use the **File>** New> Layout command in the menu (page 136).
- For information on saving a chart as an HTML file, see page 634.
- For information on creating a new chart, see page 79.
- For information on saving templates, see page 151.
- For more information on the Shortcut Bar and menus found in the Save dialog, see page 100.

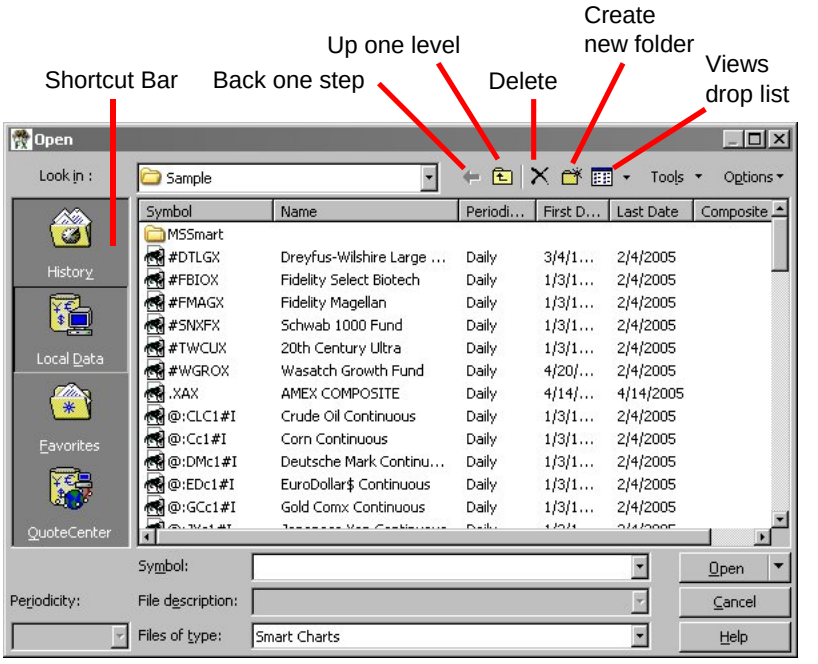
Save All Command

You use the Save All command to save all open charts and layouts to their existing file names. If a chart or layout is unnamed, the Save As dialog will appear prompting you to provide a name.

For information on saving charts, see page 83.
For information on saving layouts, see page 141.

Special Controls in the New, Open, and Save Dialogs

The New, Open, and Save dialogs are very versatile. From these dialogs you can control the information listed with the securities, rename securities, sort the list of securities, and delete folders, charts, layouts and templates.



The items on the Shortcut Bar give you quick access to your charts. The controls in the **Tools** and **Options** menus are dependent on the item you choose from the Shortcut Bar.

Shortcut Bar

History. The History shortcut provides quick access to the items you have recently opened. You can limit the number of items in your history list by choosing **Tools>** Limit History Items after choosing History from the Shortcut Bar. To delete all items from your History, choose **Tools>** Clear History Items after choosing History from the Shortcut Bar.

Local Data. Choose Local Data from the Shortcut Bar to display the last folder you opened a local chart from.

Favorites. Choose Favorites from the Shortcut Bar to display your list of favorite items. To add an item to your favorites, choose **Tools>** Add to Favorites or right-click on the item and choose

Add to Favorites from the shortcut menu. To organize your favorite items into folders, right click the Create folder from the Add Favorites dialog when adding an item to favorites, or choose Create new folder from the shortcut menu when right-clicking on an item in your favorites folder. For more information on favorites, see page 562.

<Online Data Vendor>. The current online data vendor is listed on the Shortcut Bar for quick access to online data.

To select folders and securities from the online data vendor shortcut:

1. Click this shortcut, then choose from the list of folders and securities. The list of securities that is displayed when you first select the online vendor shortcut includes all securities available from that vendor.
2. Choose a folder to filter this list.
   When using the Change Security commands, the folder you opened the original security from will be used to scan the securities. For example, if you open IBM from the S&P 100 folder, using the Next Security button on the Chart Toolbar will scan through the securities in the S&P 100 folder only. If you open IBM from the main list of securities, it will scan through the entire list.

Tools Menu

Select All. Select this to select all securities currently displayed in the dialog.

Add to Favorites. Select this to add the selected item(s) to your Favorites folder.

Symbol Database. Select this to display the Symbol Database for the current online vendor. From this dialog, you can edit or delete existing symbols, or add new symbols.

New Symbol. Select this to add a symbol to the Symbol Database.

New Local Security. Select this to display the New Security dialog from which you can create a new local security file.

Find Local Security. Select this to display the Find dialog. This dialog is used to search your disk for specified securities. For more information on using the Find command, see page 103.

Clear History. Select this to remove all items from your History. This is available only when you choose History from the Shortcut Bar.

Limit History Items. Select this to change the number of items listed in your history. This option is available only when you choose History from the Shortcut Bar.

Clear Favorites. Select this to remove all items from your favorites. This is only available when you choose Favorites from the Shortcut Bar. For more information on favorites, see page 562

Properties. Select this to display detailed information about the selected item. If an online security is selected, the Edit Symbol dialog appears, allowing you to change the properties of the selected security in the Symbol Database. Some of the information in the Properties dialog can be viewed by choosing the Details view from the **Views** drop-list at the top of the dialog.

Options Menu

View By Symbol. Select this to view the securities by ticker symbol.

View By Name. Select this to view the securities by name.

Load Options. Select this to specify the amount of data to load and display when a chart is created (page 81).

Open with template. Select this to select a template to apply to the security. For more information on applying templates, see page 147.

Remove Existing Charts. Select this if you want all open charts to be closed before displaying the new chart.

Using the Open Dialog Toolbar

Choose List from the **Views** drop-list to display just the securities' names or ticker symbols.
Choose Details to display name, periodicity, date ranges, etc.

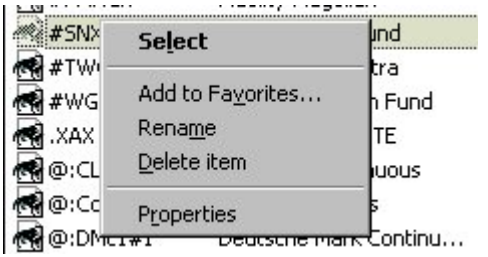
If the dialog is in Detail mode, you can sort the list by clicking on the column headings. Click on the column heading you want the list sorted by. Click on the heading a second time to reverse the sort order. You can also resize the width of the columns by dragging the column heading separators.

The Recent button takes you back to the folder you were viewing prior to the current folder. The Up One Level button allows you to move to the folder that is up one level from the current folder. The Create New Folder button allows you to create a new folder in the current folder.

Charts, layouts, templates and folders can be deleted by selecting the item, then clicking the Delete button. You may also delete these items by right-clicking on the item and choosing Delete from the shortcut menu.

Using the Right-click Shortcut Menu

You can right-click directly on an item in the list to display commands specific to that item.



Rename. Choose the Rename command to rename the item. This command is available only for items saved on a local drive (i.e., local securities, folders, layouts, charts, templates, etc.)

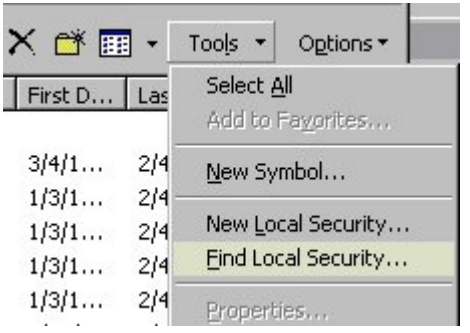
Delete item. Choose Delete item to delete the selected item.

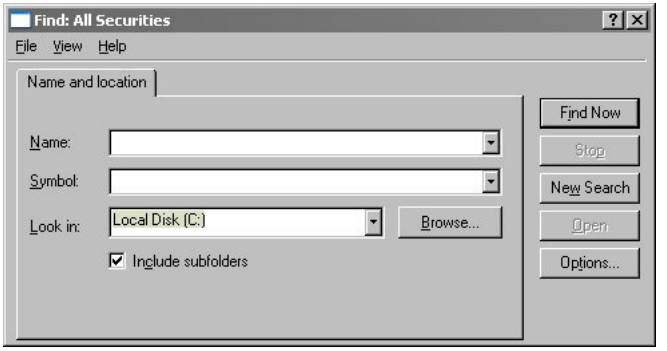
Add to Favorites. Choose this to add the selected item(s) to your Favorites.

Properties. Choose this to display detailed information about the selected item. If an online security is selected, the Edit Symbol dialog appears, allowing you to change the properties of the selected security in the Symbol Database. The Properties dialog can also be accessed by choosing **Tools>** Properties. Some of the information in the Properties dialog can be viewed by choosing the Details view from the **Views** drop-list at the top of the dialog.

Searching for Securities with the Find Command

The Find command lets you search your disk for securities by name and/or symbol. The results of the search are displayed at the bottom of the dialog. This command is available from the Open and New dialogs by choosing **Tools>** Find Local Security.





Name. Enter the name of the security to find, or use the drop-list to select from previously entered names.

Use the wildcard character * to find any character.
For example, *M** will find all securities beginning with the letter "M" and *ME** will find all securities beginning with the letters "ME". Leave the box blank to find all securities in the specified drive and folder.

Symbol. Enter the symbol of the security to find. or use the drop-list to select from previously entered symbols. See the information about using wildcard characters in the Name section above.

Look in. Enter (or select with the **Browse** button) the folder to search.

Include subfolders. Check this box if you want the search to include subfolders for the folder specified in the Look in box.

Find Now. Click this button to start the search.

Stop. Click this button to stop a search in progress. If you stop before the search is complete, no securities will be listed.

New Search. Click this button to clear the current search and specify a new one.

Open. Click this button to open a chart of the selected security.

Options. Choose this button to display the Load Options dialog, where you can control the amount of data to display in the chart (page 81).

If the specified securities are found, the dialog will expand and list the securities. To display a security's chart, select the security and click the **Open** button, or double-click on the security's name.

Note: You can right-click on the listed securities to change the way the files are displayed (i.e., by name, by symbol, small icons, large icons, detail or list). You can sort the listed securities by clicking on the column headings.

Deleting Chart and Layout Files

Each chart and layout is saved with a unique file name. Charts are saved with a `*.mwc` extension; layouts with `*.mwl`.

Charts and layouts

Charts and layouts can be deleted from the Open dialog by choosing Delete from their right-click shortcut menu, or by clicking the **Delete** button.

Securities

Securities can only be deleted using The DownLoader (page 74).

Templates

Templates can be deleted from the Open Template dialog (page 150) by choosing Delete from their right-click shortcut menu, or by clicking the **Delete** button.

To delete charts or layouts

1. Choose **File>** Open.
2. Choose Layout or Charts from the **List Files of Type** drop-list.
3. Right-click directly on the layout or chart to delete.
4. Choose Delete from the shortcut menu.

Customizing a Chart's Appearance

Chart Window

Selecting a Chart

Before any changes can be made to a chart, the chart must be selected. You can select a chart from the Window menu (a checkmark designates the selected chart), or by clicking anywhere on the chart. The selected chart is distinguished by its unique title bar color. The name of the selected chart is also shown in the Application's title bar.

The chart of **Altiris** above has a different title bar color than the others. This lets you know that it is the selected chart.

To select a chart

Do one of the following:

- Click the mouse anywhere on the desired chart.
- Choose the desired chart at the bottom of the Window menu.

Modifying a Chart

To open the Chart Window Properties dialog, choose **Format>** Chart Window, or right-click on a chart and choose Chart Window Properties from the shortcut menu.

Modifications made to a chart's window are retained automatically by MetaStock's Smart Chart feature if you are working with a Smart Chart. If you are working with a chart or layout, you should save the chart or layout to retain the changes.

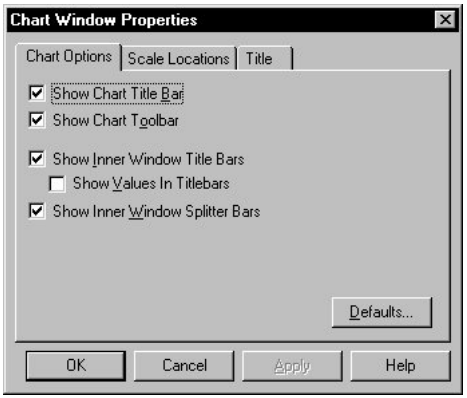
To modify a chart

1. Right-click on the desired chart.
2. Choose Chart Window Properties from the shortcut menu.
3. Make the desired changes in the Chart Window Properties dialog.
4. Click **OK**.

For information on modifying an inner window's properties, see page 112.

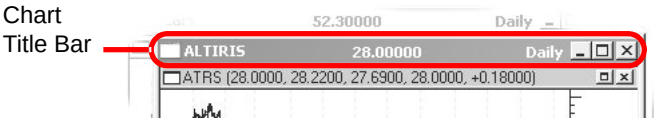
Chart Options tab

The Chart Options tab lets you control the display of the title bars, tool bars, and splitter bars.



Show Chart Title Bar. Check this box if you want the title bar of the selected chart displayed. The chart title bar displays the name of the chart (or layout) and the information specified in the Title tab of this dialog (page 107).

To control the display of the chart title bar for all charts, use the Application Properties dialog (page 41).

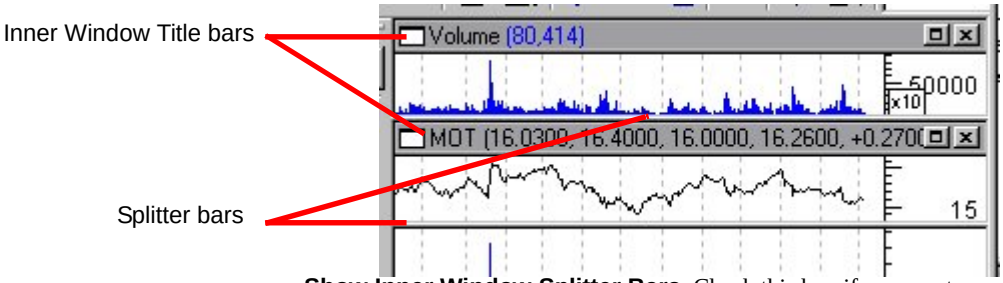


Show Chart Toolbar. Check this box if you want the toolbar of the selected chart displayed. For more information on the chart toolbar, see page 29.

To control the display of the chart toolbar for all charts, use the Application Property dialog (page 41).

Show Inner Window Title Bars. Check this box if you want the inner window title bars in the selected chart displayed. The inner window title bars display the names of the plots (e.g., security name, indicator name, etc.) in the inner window. If you choose the accompanying "Show Values in Title Bars" box, the last period's value for the plot in each inner window will display.

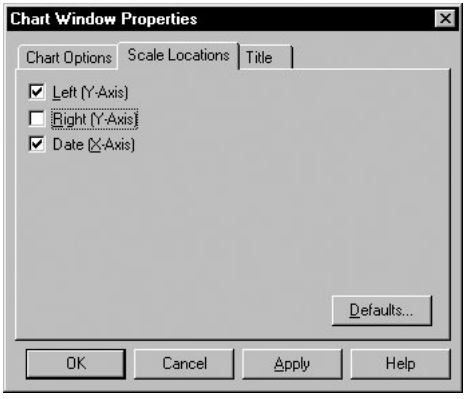
If this checkbox is grayed, it means that the display of at least one of the inner window title bars is being controlled by the inner window's properties page (page 114).



Show Inner Window Splitter Bars. Check this box if you want splitter bars between the inner windows. The splitter bar allows you to resize inner windows with the mouse (page 115).

Scale Locations tab

The Scale Locations tab lets you control where the measurement scales are displayed on the chart.



Left (Y-Axis). Check this box if you want a y-axis scale displayed on the left side of all inner windows in the chart. Use the Y-Axis Properties dialog to control properties of the scale itself (page 125).

Right (Y-Axis). Check this box if you want a y-axis scale displayed on the right side of all inner windows in the chart. Some people like to have just the right y-axis displayed since it is closest to the most recent data. Use the Y-Axis Properties dialog to control properties of the scale itself (page 125).

Date (X-Axis). Check this box if you want an x-axis scale displayed at the bottom of the chart window. The same x-axis scale is used for all inner windows displayed in a chart. Use the X-Axis Properties dialog to control properties of the scale itself (page 119).

Title

The Title tab lets you control what is displayed in the center and right side of the title bar.

Notes:

- While you can control what is displayed in the center and right side of the title bar, the name of the chart is *always* displayed on the left side.
- If you display the "Last Price" in an intraday chart, the change in price from the previous day's close is also included in parenthesis.

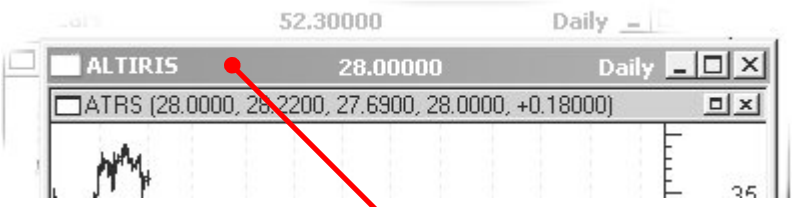
Center. Choose the information to display in the center of the title bar.

Right. Choose the information to display on the right side of the title bar.

Description. These boxes are used to enter or edit a description about the selected chart and/or layout. This description appears in the Open dialog (page 95). Charts that are members of a layout share the same layout description.

Repositioning Charts

Since a chart is contained within a window, repositioning a chart is just a matter of using the click and drag technique common to all Windows programs. If the title bar of a chart is not displayed, you can still move a chart by typing ALT+ "-" to access the chart's system box, choosing Move, and then using the arrow keys.



To reposition a chart

1. Position the mouse pointer over the chart's title bar.
2. Click and drag the mouse until the chart is in the desired location.

Note: You can quickly arrange the charts on your screen with the Window menu windowing (tile, cascade, etc.) commands. (page 19).

Resizing Charts

Since a chart is contained within a window, resizing a chart is just a matter of using basic click and drag techniques common to all Windows programs. For information on resizing inner windows within a chart, see page 115.

To resize a chart

1. Position the mouse pointer over the chart's border until a double-headed resizing arrow appears.
2. Click and drag the mouse until the chart is the desired size.

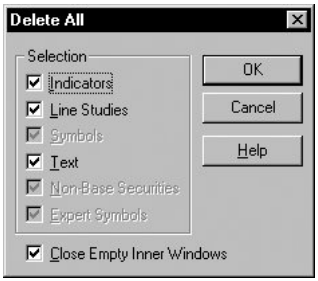
Note: You can quickly enlarge a chart to full-screen with the maximize button, or you can minimize a chart with the minimize button. The minimize/maximize buttons are found in the upper-right corner of a chart. You can restore a minimized chart to its original size by double-clicking directly on the minimized chart's title bar.

Minimize/Maximize buttons

The application itself (i.e., the MetaStock program) is also contained within a window. It can be resized using the same methods described above.

Clearing a Chart

The Delete All command in the Edit menu provides a quick and convenient way to remove indicators, line studies, symbols, text, and non-base securities from your chart. Simply click on the items you want removed from the selected chart and click the OK button. The chart will redisplay with the selected items removed.



Click the "Close Empty Inner Windows" box if you want MetaStock to close any leftover inner windows.

Inner Windows

Opening Inner Windows

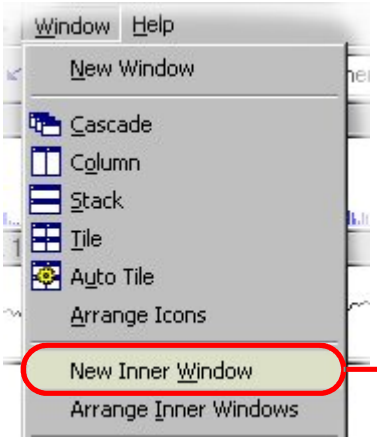
An inner window is a window within a chart window that can be controlled within the confines of the chart window. A chart can contain up to 10 inner windows. The most common reason for opening an inner window is to plot an indicator. However, price plots are also contained within an inner window.

There are four ways to open an inner window.

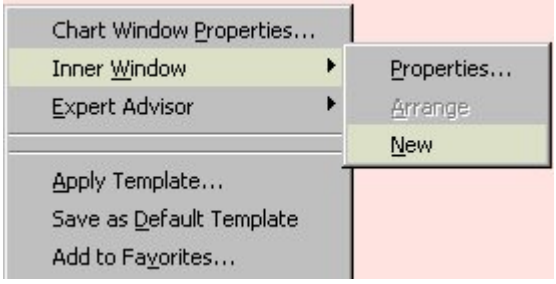
- You can use the Indicators command (page 238) from the Insert menu to plot an indicator in a new inner window.

- You can drag and drop an indicator from the Indicator QuickList (page 239) onto the chart's title bar or an existing inner window title bar.

- You can choose New Inner Window from the Window menu.



- You can choose Inner Window, New from the chart shortcut menu. Right-click anywhere on a chart to access the chart shortcut menu.



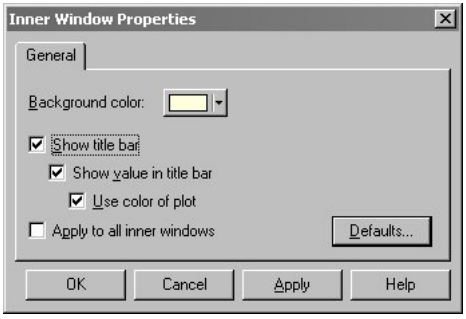
If you don't want to plot an indicator in an inner window (perhaps you'd like to copy another security's prices into it), you should use one of the last two methods above to create an empty inner window.

Modifying Inner Windows

The properties of an inner window are modified with the Inner Window Properties dialog. This dialog is accessed by right-clicking on an inner window and selecting Inner Window> Properties from the shortcut menu.

You can also choose Format> Inner Window. This command acts on the inner window most recently modified or clicked in.

If you are working with a Smart Chart, modifications made to an inner window are retained automatically. If you are working with a chart or layout, you should save the chart or layout to retain the changes.



Background Color. Choose the desired background color for the inner window. You should choose a color that is different from any other items plotted in the window (e.g., a blue indicator on a blue background will disappear).

Show Title Bar. Check this box if you want to display the inner window's title bar. The title bar displays the contents of the inner window (e.g., indicator, security name, etc.) and provides a system box and maximize/restore buttons.

Show Value In Title Bar. Check this box if you want the inner window to display the value of the last period's plot(s).

Use Color of Plot. Check this box if you want the plot values in the inner window title bar to match the color of the plot(s).

Apply to All Inner Windows. Check this box if you want the settings in this dialog to apply to all inner windows within the chart. Leave it unchecked if you only want the settings to apply to the selected inner window.

If an indicator is calculated on a security other than the chart's base security, the name of the security is shown in parenthesis after the indicator's name in the inner window's title bar.

To modify an inner window

1. Right-click within the desired inner window.
2. Choose Inner Window> Properties from the shortcut menu.
3. Make the changes to the Inner Window Properties dialog.
4. Click **OK**.

For information on modifying a chart's properties, see page 108.

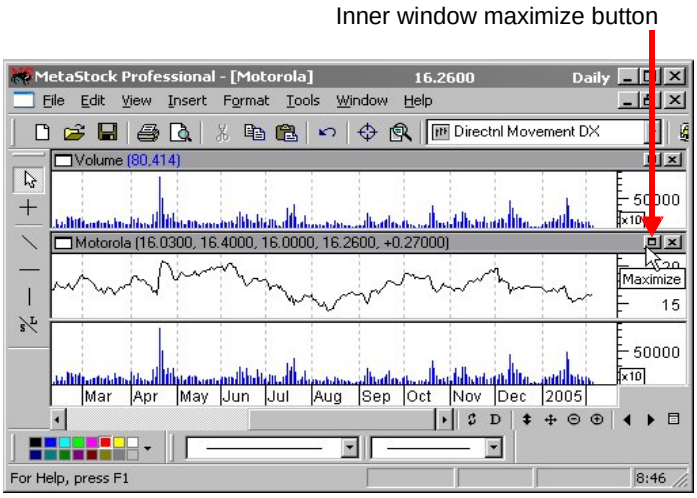
Resizing Inner Windows

The height of an inner window can be adjusted several ways including using the splitter bar, maximize/restore buttons, and the Arrange Inner Window command. Adjusting the height of an inner window is useful if you want to provide more space for a certain price plot or indicator. Maybe you'd like to temporarily see the indicator enlarged to fit the entire chart window. Or maybe you always like to have the base security plot occupy three-fourths of the chart.

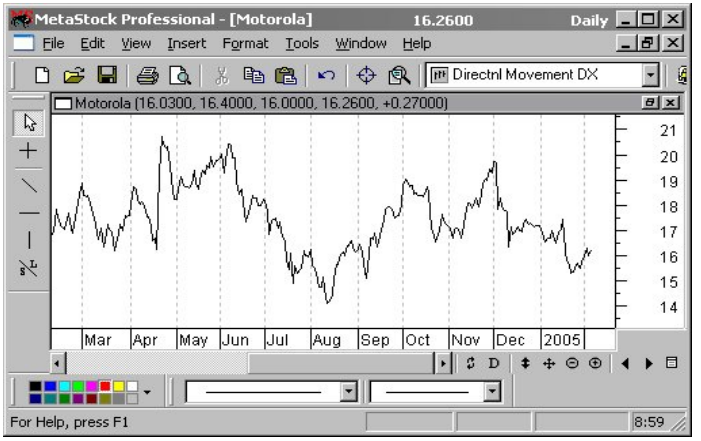
The Arrange Inner Windows command is available from the Chart shortcut menu by right-clicking on an inner window. You can also choose Arrange Inner Windows from the Window menu. The Arrange Inner Windows command resizes the inner windows within a chart so they are equally sized.

Click on an inner window's maximize button to enlarge the inner window to occupy the entire chart. To restore the chart to its pre-maximized state, click the restore button.

Before *maximizing the MACD's inner window...*



After *maximizing the MACD's inner window...*



For more information on resizing charts, see page 111.

Resizing With The Splitter Bar

An inner window can be resized with the splitter bar by positioning the mouse pointer over the border above an inner window, clicking the mouse, and dragging the border up/down until the inner window reaches the desired size.

Moving Inner Windows

One of the great advantages of having charts divided into inner windows is that the inner windows can be easily resized and even moved. For example, if you have a chart with the indicator displayed above the price and you'd like the indicator below the price, you can simply drag and drop the inner window so that it appears where you'd like. You can even drag an inner window from one chart to another.

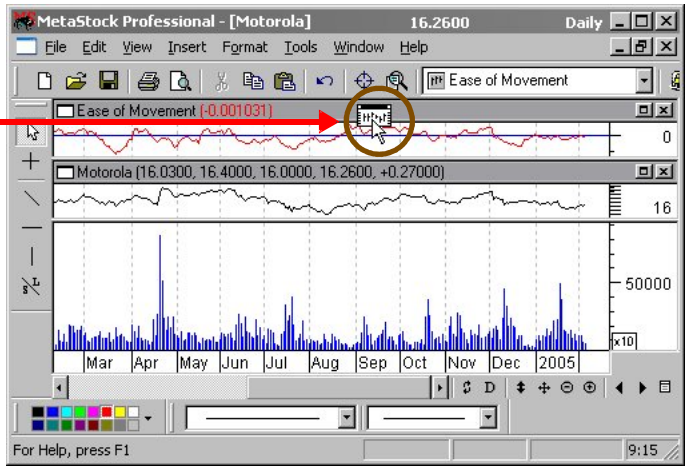
To move an inner window

Move pointer

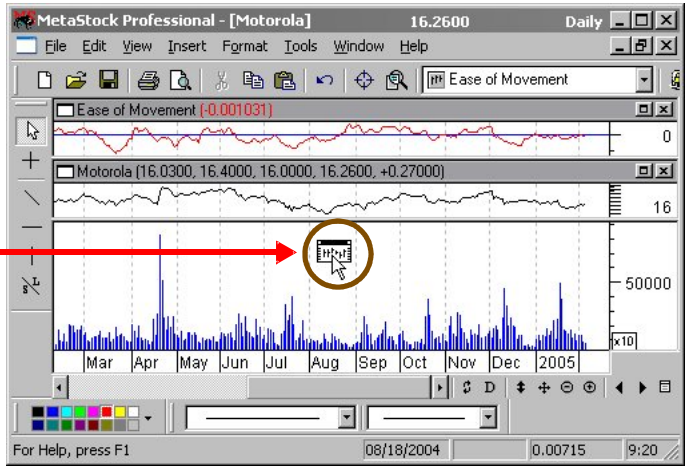
1. Position the mouse on the inner window's title bar. Notice that the mouse displays a special move pointer. This tells you that the inner window can be moved.
2. Click *and hold* the left mouse button on the inner window's title bar and drag the inner window until it is located where you'd like. Note that you can even drag an inner window to another chart.

3. Release the mouse button to drop the inner window.

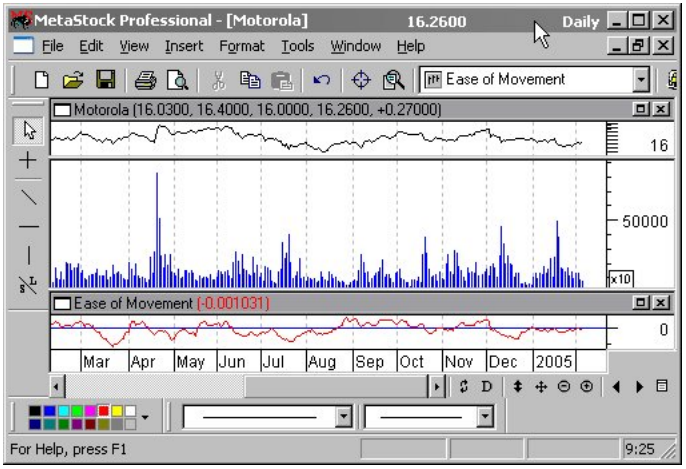
Position the mouse cursor on the inner window's title bar, then click and hold the left mouse button. Notice the change in the cursor.



Drag the cursor down and drop (release) it anywhere within the other inner window

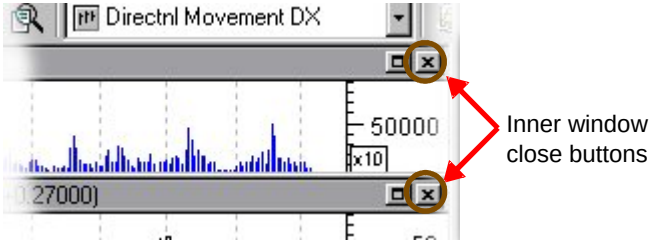


For more information on moving charts, see page 111.

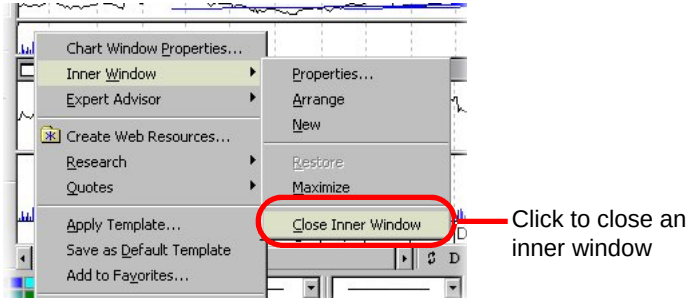


Closing Inner Windows

Inner windows are closed much like a normal window. You can click the inner window's close box in the top-right corner or you can double-click the system box in the top-left corner.



If an inner window does not have a title bar displayed (which means there is no close box or system box to click), you can still close the inner window. Right-click on the inner window and choose Inner Window then Close Inner Window from the chart shortcut menu.



Note: You cannot close the last inner window. A chart must contain at least one inner window.

To close an inner window

Do one of the following:

- Double-click the inner window's system box.
- Click the inner window's system box and choose Close Inner Window.
- Click the Close button on the right side of the inner window title bar.
- If the inner window's title bar is not displayed, right-click on the inner window and choose Inner Window, then Close Inner Window.

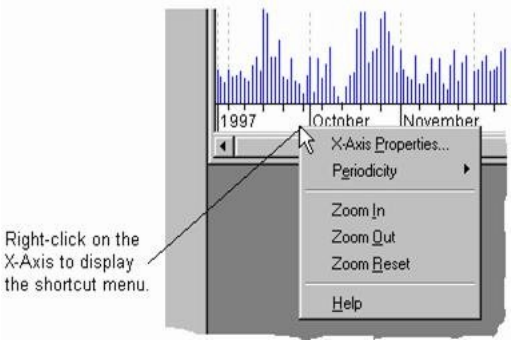
Scales

MetaStock handles the scaling of charts automatically based on the data plotted. However, you can override the automatic scaling by changing the properties of the scales or by using the Zoom Scaling tools (see page 131).

X-Axis Properties

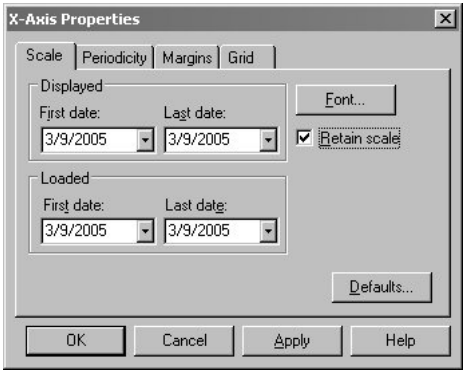
The x-axis (or date scale) is located along the bottom of a chart. One x-axis is shared by all inner windows in the chart.

You can change the properties of the x-axis by right-clicking directly on the chart's x-axis or by choosing X-Axis from the Format menu.



Scale

The Scale page is located in the X-Axis Properties dialog. Choose **Format>** X-Axis (or right-click on a chart's x-axis and choose X-Axis Properties from the shortcut menu).



Displayed. These First Date and Last Date boxes control the range of data displayed on the chart. This range cannot be outside of the range of data loaded.

Loaded. These First Date and Last Date boxes control the range of data loaded from the data file.

Note: If the Scale is set to intraday, then "T" and "D" buttons appear next to the date fields. Click the "**D**" button to enter dates. Click the "**T**" button to enter times.

Retain Scale. Check this box if you want the x- and y-axis to be scaled as currently specified when the chart is opened using **File>** Open. Checking this box instructs MetaStock to override the settings in the Load Options dialog (page 81).

Note: If the active chart is part of a layout, the Retain Scale option is disabled as layouts remember the exact scaling for each individual chart in the layout at the time the layout was saved.

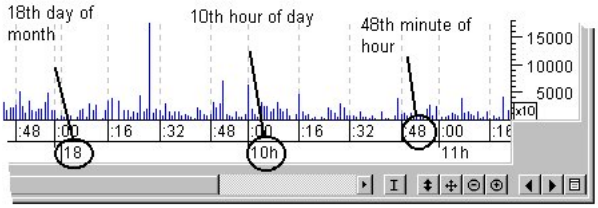
Font. Click this button to display the standard Windows Font dialog. Use this dialog to specify the font for the x-axis labels. For more information on fonts, see page 246.

To load more data using the Scale page

1. Right-click on the chart's x-axis.
2. Choose X-Axis Properties.
3. From the Scale page, type an earlier date into the Loaded First Date box. Note this assumes that you have earlier data in the file to load.
4. Click the **OK** button.

To display a specific data range using the Scale page

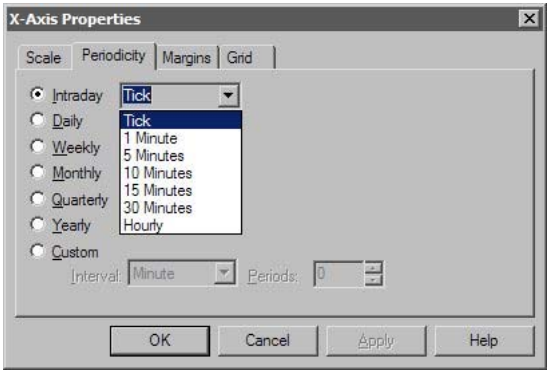
1. Right-click on the chart's x-axis.
2. Choose X-Axis Properties.
3. From the Scale page, type the range of dates to display in the Displayed First Date and Last Date boxes.
4. Click **OK**.



The x-axis of a real-time chart displays three time frames: days of month, hours, and minutes. For example, "18" means the 18th day of the month; "10h" means the 10th hour of the day; and ":48" means the 48th minute of the hour. A 5-minute bar labeled on the x-axis of a chart at 11:15 includes the first tick of 11:10:00 through the last tick of 11:14:xxx. Similarly, a 1-minute bar includes all ticks from 11:14:00 to 11:14:xxx.

Periodicity

The Periodicity page is located in the X-Axis Properties dialog (page 119). Choose **Format>** X-Axis, or right-click on a chart's x-axis and choose X-Axis Properties from the shortcut menu.



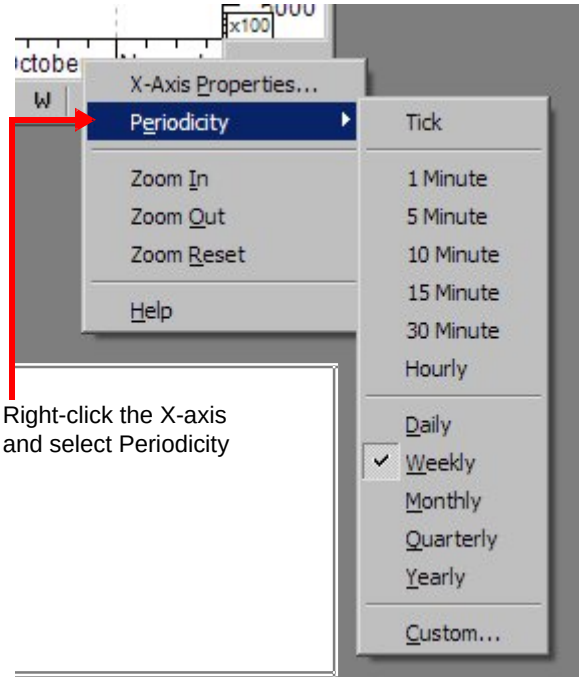
Use the Periodicity page to specify the periodicity of the data. For example, if your chart contains daily data, you could change the data into weekly bars. Or if your chart contains tick data, you could change it to hourly bars. Even though the periodicity has been changed, the same date range is maintained. So if a daily chart ranging from 06/01/96 to 12/31/96 is changed to weekly, the chart will display weekly bars for the same date range, 06/01/96 to 12/31/96.

Notes:

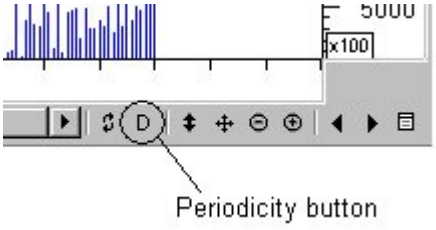
- Volume and open interest are summed over the new period. For example, monthly periodicity displays the sum of the entire month's volume.
- If the last day loaded is not the end of the selected periodicity, MetaStock displays a bar of the shortened period. For example, if today is Wednesday and daily data is loaded, the last price bar of a weekly chart represents the shortened week of Monday through Wednesday.

The Custom periodicity option allows you to control the number of periods over which to compress the data. This allows you to view the data using non-standard periods. For example, a periodicity of eight periods with daily data loaded would display a price bar every eight trading days.

You can also change the periodicity by right-clicking on the x-axis and choosing Periodicity from the shortcut menu.



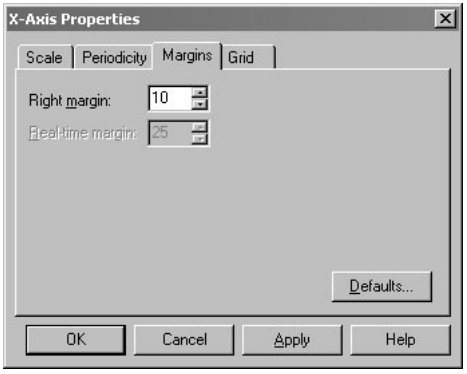
You can also click the **Periodicity** button on the chart toolbar to change the periodicity.



You can also change the periodicity with your Microsoft IntelliMouse pointing device. Hold the SHIFT key down and rotate the wheel forward to lengthen the periodicity or back to shorten the periodicity. For more information on using a scrollable pointing device, see page 35.

Margins

The Margins page is located in the X-Axis Properties dialog (page 119). Choose **Format>** X-Axis, or right-click on a chart's x-axis and choose X-Axis Properties from the shortcut menu.



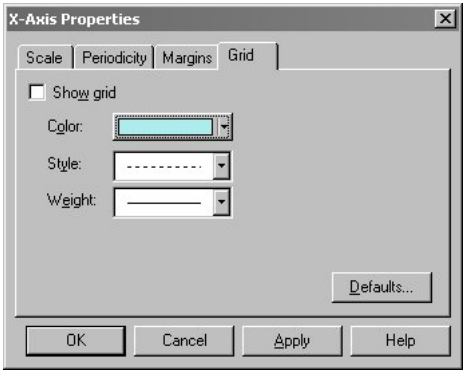
Right Margin. This box specifies how much blank space (by number of time periods) there is between the last data point and the right border of the chart. This is useful to project trendlines or other line studies into the future.

Real-time Margin. This box specifies how much blank space (by number of time periods) to display between the last data point and the right margin. This is the area of the chart where real-time bars are drawn. When the bars reach the right margin, the chart is redrawn. The larger the number, the less redrawing required. A small value (like "5") will cause the chart to redraw every fifth bar.

The following chart illustrates the location of the real-time margin and the right margin.

Grid (X-axis)

The Grid page is located in the X-Axis Properties dialog (page 119). Choose **Format>** X-Axis (or right-click on a chart's x-axis and choose X-Axis Properties from the shortcut menu).



Show Grid. Check this box if you want vertical grid lines to be displayed in every inner window at each of the x-axis labels.

Color. Choose the color of the grid lines from the drop-list.

Style. Choose the line style (dotted, dashed, etc.) of the grid lines from the drop-list.

Weight. Choose the weight (thick, thin, etc.) of the grid lines from the drop-list. If you select a heavier weight, the Style will always appear as a solid line.

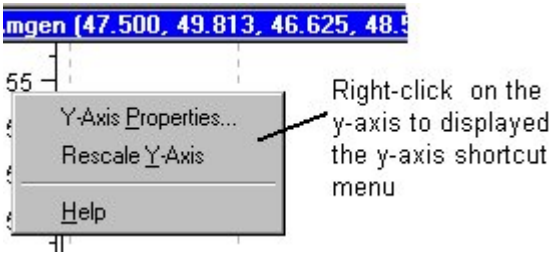
Y-Axis Properties

The y-axis of a chart is located along the side of an inner window. If you want to quickly reset the y-axis to accommodate new data that you have scrolled to with the chart's scroll bar, use the **Rescale Y-Axis button** on the chart toolbar (page 89). The Scroll Rescales Y-axis option in the Application Properties dialog. also lets you control the effect of scrolling on the y-axis (page 41).

Rescale Y-Axis button

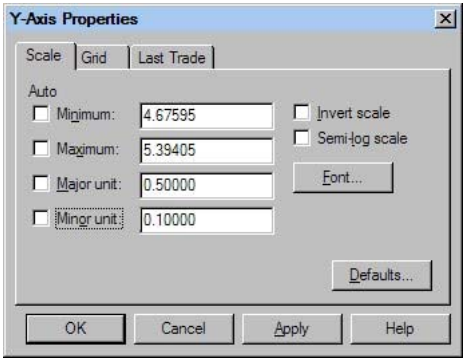
You can also change the scaling of the y-axis by using drag and drop techniques directly on the y-axis scale of the chart. For more information, see page 130.

You can change the properties of the y-axis by right-clicking directly on the chart's y-axis or by choosing **Format>** Y-Axis or **Format>** Right Y-Axis.



Scale

The Scale tab is located in the Y-Axis Properties dialog (page 125). Choose **Format>** Y-Axis or **Format>** Right Y-Axis (or right-click on an inner window's y-axis and choose Y-Axis Properties from the shortcut menu).



Check the box under the Auto heading if you want the corresponding scaling control to be automatically determined by MetaStock. If the Auto box is unchecked, you can manually enter a value.

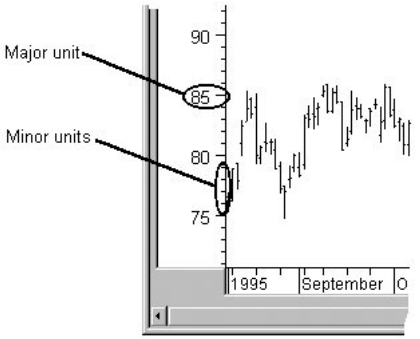
Minimum. Type the minimum value to display on the y-axis.

Maximum. Type the maximum value to display on the y-axis.

Major Unit. Type the major unit to increment the y-axis labels. For example, if you want y-axis labels to display every five units, then type "*5*". Grid lines (if enabled) are displayed at the major units.

The y-axis is displayed in decimal or fractions (e.g., eighths, 32nds, etc.) depending on the "Units" setting in the security's data file. Use The DownLoader to change the Units setting (page 74).

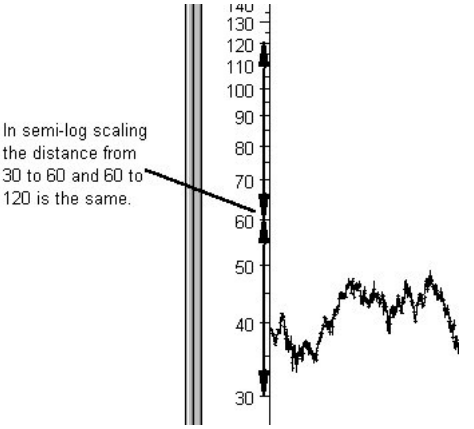
Minor Unit. Type the minor unit to increment the y-axis labels. Hash marks are displayed at each minor unit along the y-axis scale. For example, if you want scaling hash marks displayed every 2.5 units, then enter "*2.5*". If you want y-axis labels to increment by five units, then type "*5*". Notice that labels are *not* displayed on the minor units hash marks.



Invert Scale. Check this box to invert the y-axis scale. Inverting the scale of indicators that are negatively correlated with the price (e.g., Williams' %R or interest rates) is a popular use of this feature.

Semi-log Scale. Check this box if you want the y-axis scaled in semi-log. In a semi-log scaled chart, the distance between each point is exponential. For example, the distance between 30 and 60 (a 30 point, 100% increase) is the same as the distance between 60 and 120 (a 60 point, —but still 100%— increase). Semi-log

scaling is used to compare relative price changes rather than physical point changes.



Font. Choose this button to display the standard Windows Font dialog. Use this dialog to specify the font for the y-axis labels.

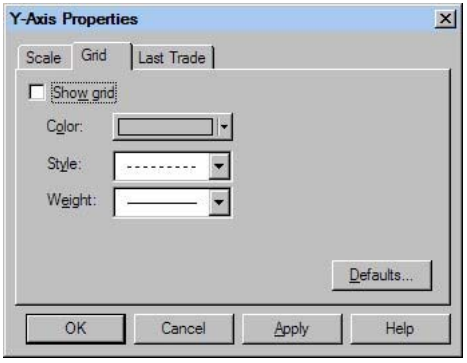
Note: If you choose a font that is too large to display without overlapping, MetaStock will not place a label at every major unit.
For more information, see page 246.

To change the Y-Axis scale

1. Right-click on the chart's y-axis scale.
2. Choose Y-Axis Properties.
3. From the Scale page, uncheck the Auto box for the Minimum and Maximum controls and type the desired values for the range of the y-axis.
4. If you want to manually specify the step size of the y-axis, uncheck the Auto box for the Major and Minor units and enter the desired values. If you want semi-log or inverted scaling, check these boxes.
5. Click OK.

Grid (Y-axis)

The Grid tab is located in the Y-Axis Properties dialog (page 125). Choose **Format>** Y-Axis, or right-click on an inner window's y-axis and choose Y-Axis Properties from the shortcut menu.



Show Grid. Check this box if you want grid lines to be displayed in the selected inner window at each of the y-axis major unit labels.

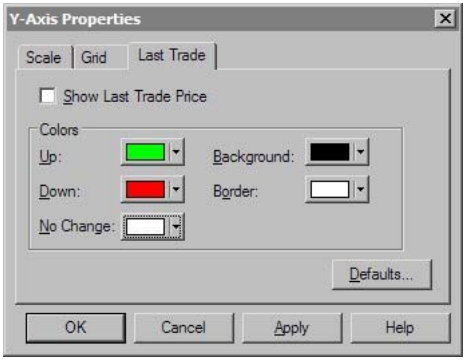
Color. Choose the color of the grid lines from the drop-list.

Style. Choose the line style (dotted, dashed, etc.) of the grid lines from the drop-list.

Weight. Choose the weight (thick, thin, etc.) of the grid lines from the drop-list. If you select a heavier weight, the Style displays as a solid line.

Last Trade (Y-axis)

The Last Trade tab is located in the Y-Axis Properties dialog (page 125). Choose either **Format>** Left Y-Axis, (or **Format>** Right Y-Axis for the right side), or right-click on the inner window's desired Y-Axis and choose Y-Axis Properties from the shortcut menu.



Show Last Trade Price. Checking this box displays the Last Trade marker on the Y-Axis.

Colors. Use this area to set the colors used for the following features.

Up. If the last trade closed up, the text will be this color.

Down. If the last trade closed down, the text will be this color.

No Change. If the last trade had no price change, the text will be this color.

Background. This color is the color behind the text (in the sample, this color was orange).

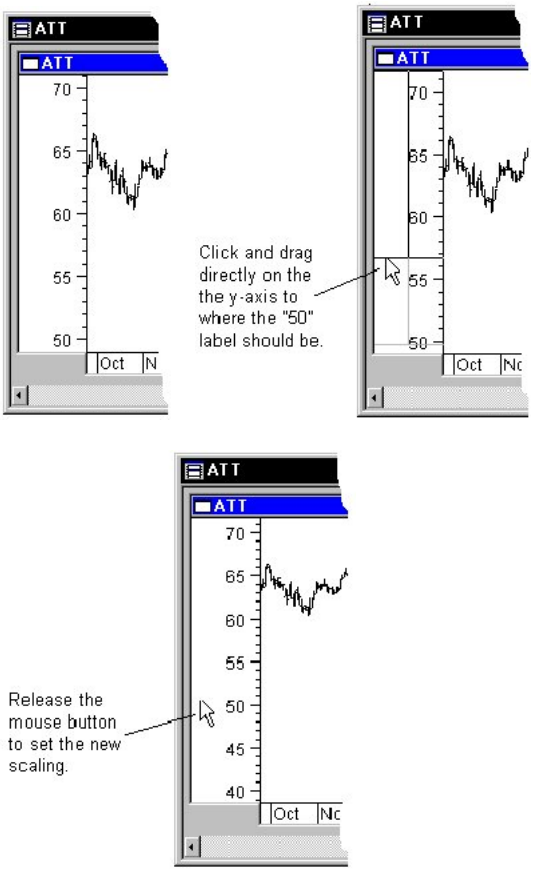
Border. This color is the color used for the border surrounding the marker .

Defaults. Click this button to restore the colors to their default values

Using Drag and Drop to Change the Scaling

Both the x- and y-axis can be adjusted using your mouse and basic drag and drop techniques. By clicking directly on a chart's x- or y-axis and dragging either up/down (for y-axis) or left/right (for x-axis), the range of the scale will be adjusted.

For example, if a chart's y-axis scale ranges between 50 and 70, you can adjust the scale to go from 40 to 70 by clicking directly on the y-axis at the "50" label, and dragging the mouse upwards. The same type of adjustment can be done with the x-axis using the same technique.



Scale Locations

Some people like to display the y-axis scale on the right side of the chart since it is closer to the more recent data.

To display/remove the x- or y-axis

1. Right-click on the chart's inner window.
2. Choose Chart Window Properties from the shortcut menu.
3. Click on the Scale Locations tab.
4. Check the Left, Right, or Date boxes to display the corresponding scales. Uncheck the boxes to remove the scales.
5. Click the OK button.

Zoom Scaling

The "Zoom In", "Zoom Out", and "Zoom Reset" commands are selected from the View menu or from the Chart toolbar. The "Zoom Box" command is selected from the View menu or from the standard toolbar.

Zoom In button

The Zoom In command progressively zooms in on the most recent data displayed in the chart. Each time the command is used, the more detailed the view of the most recent data.

Zoom Out button

The Zoom Out command changes the scaling to the previously zoomed state. For example, if you have used the Zoom In command to zoom in on the chart four times, the Zoom Out command will take you back to the third zoomed view. Using it again will take you back to the second zoomed view, etc.

Zoom Box button

The Zoom Box command allows you to define a section of the chart to enlarge.

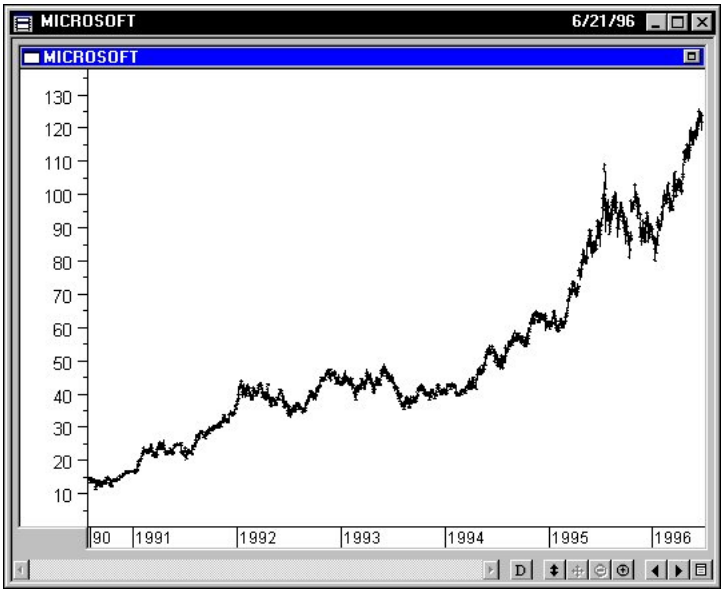
Zoom Reset button

The Zoom Reset command undoes the scaling effects of any zooming by resetting the chart's scales so that all the loaded data is displayed. The zooming can be the result of using the Zoom In and Zoom Box commands or the automatic zooming that occurs as a result of the settings in the Load Options dialog (see page 81).

You can also use the Microsoft IntelliMouse pointing device to zoom in or out on your chart. Hold the CTRL key down and rotate the wheel forward to zoom in or rotate back to zoom out. For more information on using a scrollable pointing device, refer to page 35.

The following illustrations show a chart before and after using the Zoom In command:

Before using the Zoom In command...

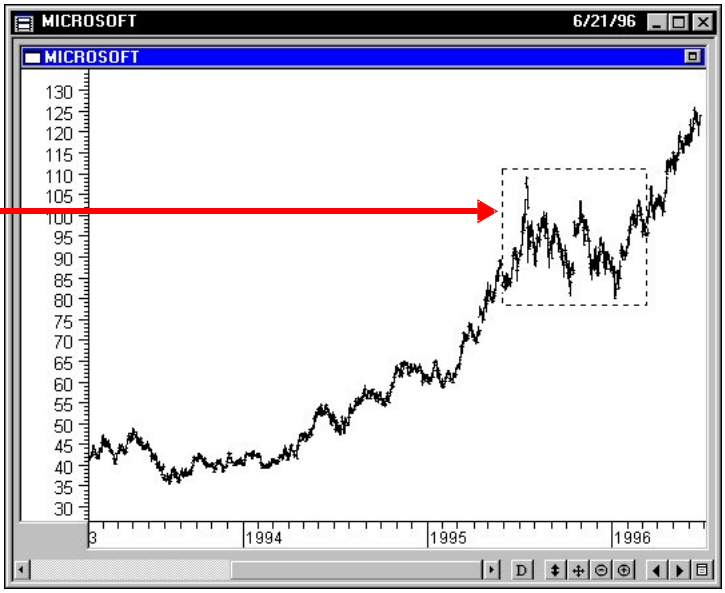


After clicking twice on the Zoom In button...

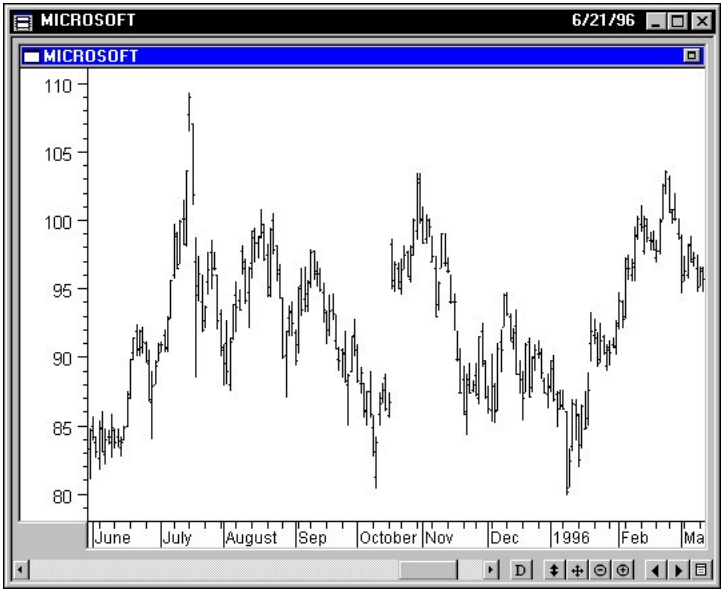
The following illustrations show a chart before and after zooming using the Zoom box command.

Before using the Zoom Box...

Zoom Box



After using the Zoom Box...



To zoom in on the most recent data

Do one of the following:

- Choose Zoom then Zoom In from the View menu repeatedly until the view you want is displayed.

Zoom In button

- Click the **Zoom In** button on the Chart toolbar repeatedly until the view you want is displayed.
- Press CTRL+ "+" repeatedly until the view you want is displayed. CTRL+ "-" zooms out.
- Using the Microsoft IntelliMouse pointing device, hold the CTRL key down and rotate the wheel forward to zoom in or rotate back to zoom out.

To zoom in on a specified area

Do the following:

Zoom box mouse pointer

1. Choose Zoom then Zoom Box from the View menu or toolbar. A small box appears next to the mouse pointer indicating that you should select an area to zoom.
2. Position the mouse pointer at one corner of the desired zoom area.
3. Click and drag the mouse pointer to the opposite corner of the desired zoom area and release your mouse button.

To reset a zoomed chart

Do one of the following:

Zoom Reset button

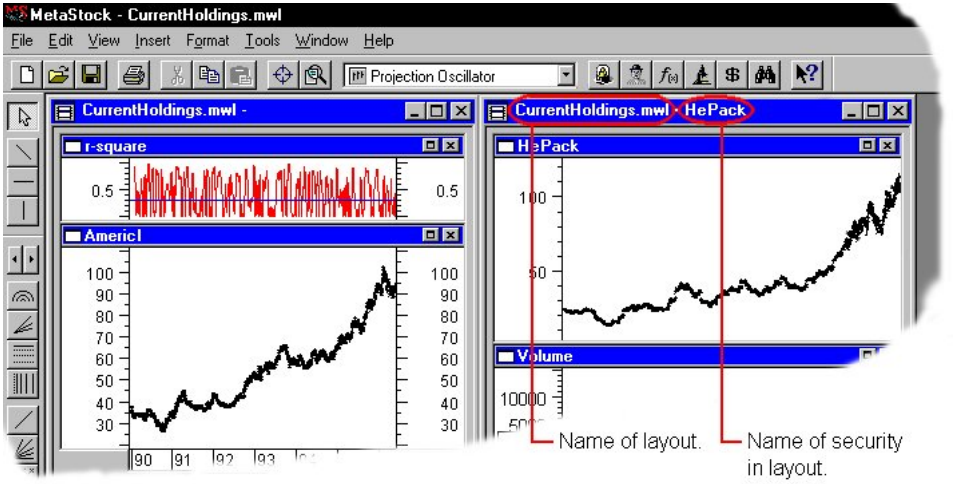
- Choose Zoom then Zoom Reset from the View menu.
- Click the Zoom Reset button on the Chart toolbar.

Combining Multiple Charts with Layouts

What is a Layout?

Layouts provide a convenient way to manage groups of charts. Maybe you'd like to combine your favorite computer stocks into one easily managed group. Or maybe you'd like to see IBM along with the Dow and four of your favorite indicators. The best way to manage such groups of charts is with a layout.

A layout itself is a single file that, when opened, brings up all the charts that were saved in the layout. When displayed on your screen, each member chart can be identified by the layout's name, which appears in each chart's heading. A layout can even include minimized charts.



When a layout is opened, each member chart is opened and positioned on the screen exactly as it appeared when the layout was saved, including the scaling. Even charts that were not visible (or were minimized) when the layout was saved will be opened.

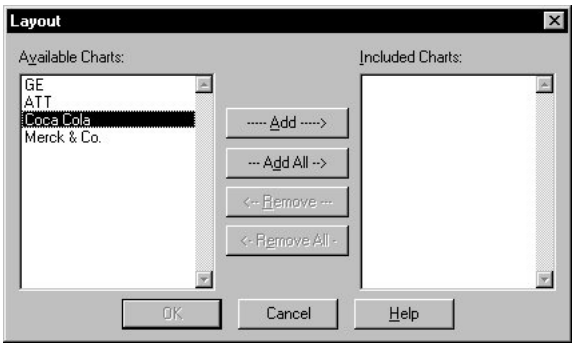
Creating a New Layout

Layouts can be created after you have opened and arranged the desired charts.

New button

Once you have opened and arranged the desired charts to your liking, use the New command in the File menu to create the layout. You'll notice that the Layout command is disabled until a chart (or charts) is opened. The Layout dialog is used to choose which charts to include in the layout.

To select multiple layouts, hold the SHIFT *or* CTRL *key down as you click the mouse.*



Until you save a newly created layout, a default name of "Layout*x*" (where "*x*" is a number) is automatically assigned. This name appears in the title bar of each chart in the layout (along with the security name). For information on saving the layout with a new name, see page 141.

Add. This button moves the selected chart(s) from the Available Charts list to the Included Charts list. You can also double-click a chart to add it to the Included Charts list.

Add All. This button moves all charts in the Available Charts list to the Included Charts list.

Remove. This button moves the selected chart(s) from the Included Charts list to the Available Charts list. This removes the selected chart(s) from the layout. You can also double-click a chart to remove it from the Included Charts list.

Remove All. This button moves all charts from the Included Charts list to the Available Charts list. This removes all charts from the layout.

To create a layout

1. Display the charts to include in the layout by using the Open (or New) command in the File menu (see page 81).
2. Modify the charts as desired (e.g., add indicators, add moving averages, resize, etc.).
3. Choose New from the File menu, and select Layout.
4. Click the **Add All** button to add all the open charts to the Included Charts list. These are the charts that will appear in the layout.

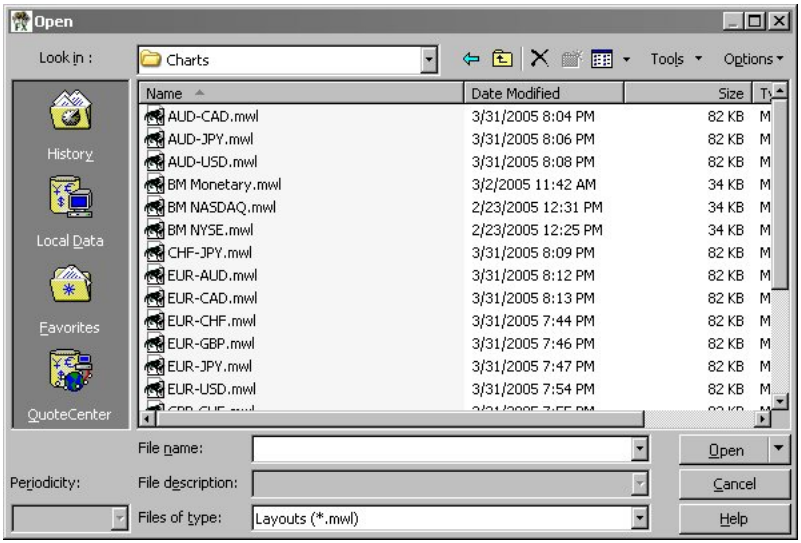
5. To save the layout, choose Save As from the File menu, and give the layout a unique file name.

Each chart will now have the name "Layoutx" (where "*x*" is a number) in the title bar to show that the chart is a member of the layout.
For more information on saving layouts, see page 142.

Displaying an Existing Layout

Open button

After a layout has been saved, it can be reopened using the Open command in the File menu. If Layouts is selected in the Files of Type drop-list in the Open dialog, all layouts in the selected folder are displayed. Layouts have a `*.mwl` file extension.



To select multiple layouts, hold the SHIFT *or* CTRL *key down as you click the mouse.*

If you want to open multiple layouts at once, you can select multiple layouts from the list in the Open dialog and click the **OK** button. Each layout you select will be opened.

If you click on a layout's name in the Open dialog, a description of the layout (if one was entered) is displayed in the Description box.

When a layout is loaded, each chart included in the layout will have the layout name in its title bar.

Note: The **Options** button (page 100) in the Open dialog is disabled if the File Type is "Layouts." This button is disabled because layouts always load the amount of data that was saved with the layout.

To display an existing layout

1. Choose Open from the File menu.
2. From the Files of Type drop-list, select Layouts.
3. From the Look in box, select the folder where the layout you want to display is located.
4. Double-click the name of the layout you want to display.

Scanning Charts in a Layout

You can use the Change Security commands to scan the securities in a folder using a layout as the template. This can be useful if you'd like to see more than one periodicity at a time, more than one Expert Advisor at a time, or like to see several different indicators plotted separately but still plotted with the price plot.

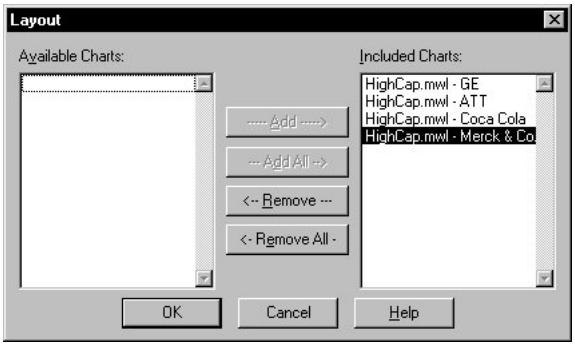
To scan your securities using a multi-chart template or layout, choose the Change All Charts in a Layout option in the Change Security options (page 84). Once this option is selected, simply click the **Next Security** or **Previous Security** buttons on the Chart Toolbar to scan your securities in a layout. If this option is not selected, only the active chart will change to the new security.

To scan charts in a layout

1. Open a layout.
2. Click the **Choose a Security** button on the chart toolbar.
3. Click the Options tab.
4. Select Use Chart As Template and Change All Charts in a Layout. Click **OK**.
5. Click the **Next**, **Previous**, or **Choose a Security** buttons from the Chart Toolbar to scan the securities in the folder containing the active chart's security.

Making Changes to a Layout

After a layout has been created, you can easily add and delete charts from the layout using the Edit Layout command in the File menu. A layout must be open before the this command is available. If you choose the Edit Layout command when there is more than one layout open, the Select Layout dialog appears (page 141). For information on the controls in the Layout dialog, see page 136.



Whenever you make changes to individual charts within a layout, be sure to save the layout (page 141) if you want the changes permanently reflected in the layout.

The scaling of individual charts within a layout are set at the time the layout is saved. Therefore, if you need to change the scaling of a chart within a layout, you must remove the chart from the layout, change the scaling, then re-add the chart to the layout.

Special windowing commands implemented exclusively for layouts allow you to cascade, stack, and tile only those charts included in a layout. By holding the SHIFT key down as you choose the cascade, tile, or stack options in the Window menu, you can arrange only those charts in the layout. This feature is handy to view charts in a specific layout on your screen when you have multiple charts and layouts open simultaneously. For more information on these windowing commands, see page 19.

If you want to save a chart that is already in a layout as a separate chart file, you should use the New Window command in the Window menu to create a duplicate of the chart (page 89) and then use the Save As command in the File menu (page 98).

Note: If you remove a chart from a layout using the Layout dialog, the chart remains on your screen and becomes an unnamed chart (e.g., Chart1, Chart2, etc.).

To edit charts within a layout

1. Choose Open from the File menu.
2. Select Layout from the Files of Type drop-list.
3. Select the desired layout and click **Open**.
4. Make the desired changes to the chart(s) within the layout.
5. Choose **Save** from the File menu.

To add charts to a layout

1. Choose Open from the File menu.
2. Choose Layout from the Files of Type drop-list.
3. Select the desired layout and click **Open**.

OR

1. Choose Open from the File menu.
4. Select Smart Charts from the Files of Type drop-list.
5. Select the charts you want to add to the layout and click **Open**.
6. Choose Edit Layout from the File menu.
7. Select the charts you want to add to the layout from the Available Charts list and click the **Add** button to add them to the Included Charts list. You can also double-click a chart to add it to the Included Charts list.
8. Click the **OK** button.

To delete charts from a layout

1. Choose Open from the File menu.
2. Select Layout from the Files of Type drop-list.
3. Select the desired layout and click **Open**.
4. Choose Edit Layout from the File menu.
5. Select the charts you want to delete from the Included Charts list and click the **Remove** button. You can also double-click a chart to remove it from the Included Charts list.
6. Click the **OK** button.
7. The charts will remain on your screen until you have saved, closed, and reopened the layout.

System box

You can also remove a chart from a layout by:

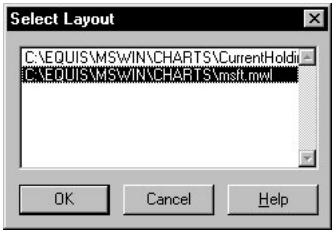
1. Double-clicking the chart's system box in the upper left corner of the chart. After you do this, the Close Layout dialog (page 143) will appear.
2. Select Close the chart and remove it from the layout and click **OK**.

To tile/stack/cascade charts in a layout

1. Select a chart in the layout you want to arrange by clicking anywhere on the chart.
2. Hold the SHIFT key down to arrange only the charts in the layout, then click the tile, stack, or cascade button on the toolbar.

Select Layout Dialog

If you choose the Edit Layout command when you have more than one layout open, you are prompted to select the layout to edit from the Select Layout dialog.



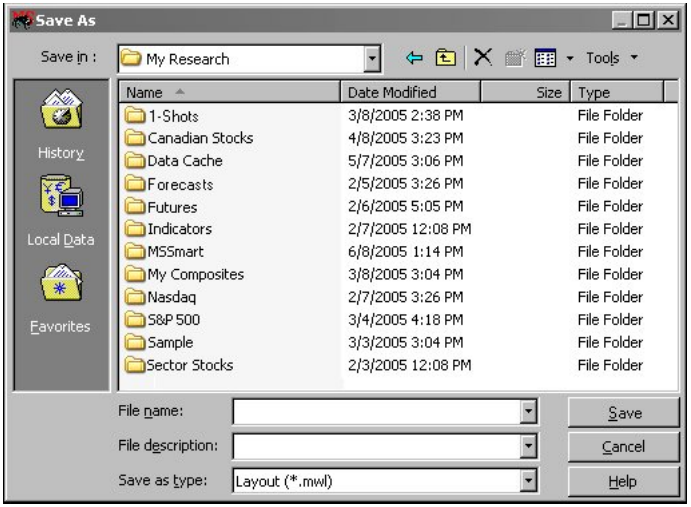
To select the layout to edit, you can either double-click the layout or click the layout and click the **OK** button.

Saving a Layout

Save button

When you make changes to a layout, you should save the layout using the Save or Save As commands in the File menu. The **Save** command saves the layout to its existing name.

The **Save As** command lets you specify a new name (and location) for the layout.



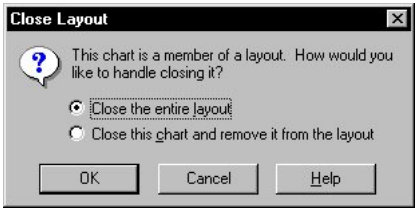
If you use the Save command to save a layout and the layout is unnamed (i.e., a newly created layout), the Save dialog will appear prompting you to provide a name. If you attempt to close a layout to which you have made changes, you will be asked if you want to save the layout first. We recommend that you save your layouts often when making extensive changes so that you avoid losing your work due to power outages or other unplanned events.

To save a layout

1. Select the layout you want to save by clicking directly on any chart in the layout.
2. Choose Save from the File menu. If the layout is new and unnamed, you will be prompted to supply a name in the Save dialog (page 98).

Closing a Layout

Since a layout is a set of charts, whenever you attempt to close a chart within a layout, the Close Layout dialog appears prompting you to close just the chart or to close the entire layout.



If you attempt to close a layout to which you have made changes, MetaStock will ask you if you want to save the layout. If you attempt to close a layout that has never been saved before (e.g., a newly-created layout), MetaStock displays the Save As dialog in which you can provide the layout a name.

To close a layout

1. Select a chart in the layout you want to close and do one of the following:
   - Choose Close from the File menu.
   - Click the Close box in the upper-right corner of any chart in the layout.
   - Choose Close Layout from the chart's control menu. The control menu is displayed by clicking on the system box in the upper left corner of the chart.
   - Double-click the chart's system box in the upper-left corner of the chart.
     When the Close Layout dialog appears, choose Close the entire layout, then click the **OK** button.

Close button

System box

Broad Market Layouts

MetaStock includes three predefined layouts designed to give you a quick overview of the Monetary market and the NYSE and Nasdaq exchanges. The layouts include:

BM Monetary.mwl – This layout contains two charts of daily data for the Monetary market and six BM indicators.

BM NASDAQ.mwl – This layout contains one chart of weekly data for the NASDAQ, one chart of daily data for the NASDAQ, and four BM indicators per chart.

BM NYSE.mwl – This layout contains one chart of weekly data for the NYSE, one chart of daily data for the NYSE, and four BM indicators per chart.

Note: You must install MetaStock on your C: drive for Broad Market Layouts to work.

To Open a Broad Market Layout:

1. In MetaStock, select **File>** Open.
   The Open dialog appears.
2. At the bottom of the dialog, change Files of Type to "Layouts (*.mwl)". The layouts should appear.
   (If the layouts don't appear, you'll need to navigate to their location. Their default location is `C:\Program Files\Equis\MetaStock\Charts`).
3. Select a layout and click **Open**.

Forex Layout Templates

There are four Forex (FX) layouts included with MetaStock; these are pre-configured with all the necessary indicators and Experts attached, and have all the indicators and price plots formatted with the appropriate styles and colors.

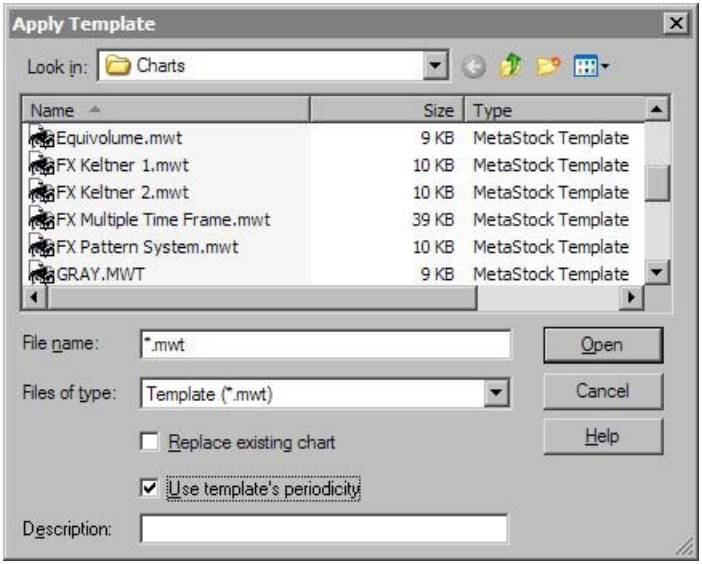
You can open them in the same way that you would open any other layout.

Applying a Forex layout template to a chart:

1. Right-click on the chart.
2. Choose Apply Template from the shortcut menu.
3. Check Use template's periodicity.

Caution: If this is not checked, the layout may not open correctly.

4. Choose the desired template from the **Apply Template** dialog.



5. Click **Open**. The layout appears .

Recycling Your Work with Templates

What is a Template?

A template contains all the information in a chart or layout excluding the base security. A template is applied to a security (either to an existing open chart or when loading a chart) at which time a new chart or layout is created based on the template's information. Each template is saved as a file with a `*.mwt` extension.

Once a template is created, it can be used over and over.

If the information from a template came from a single chart, then a chart is created when the template is applied. If the information came from a layout, then a multi-chart layout is created.

For example, suppose you like to analyze your securities with an RSI, MACD, and a 50-day moving average. You could save this information in a template and apply it to any security in one quick step.

You can also create a default template that is always used when a new chart is created (page 151).

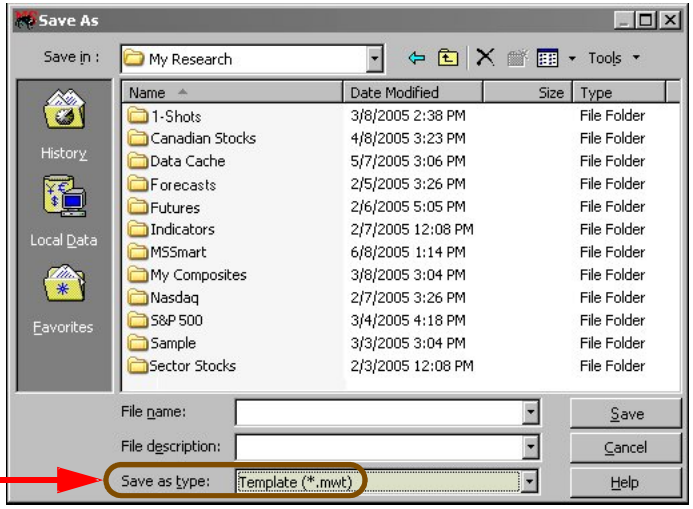
Creating a New Template

A template is created from the information in either a chart or a layout. Once the chart or layout appears as you'd like, use the Save As command in the File menu to save the template. If you create a template when a multi-chart layout is selected, a multi-chart template is created. If you create a template when a single chart is selected, a single-chart template is created.

To create a template

1. Choose Open from the File menu.
2. Choose Smart Chart, Chart or Layout from the File of Type drop-list.
   - Choose Smart Chart or Chart to create a single chart template.
   - Choose Layout to create a multi-chart template.
3. Select the desired chart or layout and click the **Open** button.
4. Make the desired changes to the chart (i.e., add indicators or moving averages, change the scaling, etc.).
5. Choose Save As from the File menu.

6. Choose Template from the Save as type drop-list.
7. Type a name in the File Name box.
8. Click the **Save** button.



Choose "Template" here to save the chart or layout as a template

Applying an Existing Template

Templates can be applied to a chart on the screen, when you open a Smart Chart from the Open dialog, or when you create a new chart. When a template is applied to a chart, the template uses the chart's base security for all charts in the template.

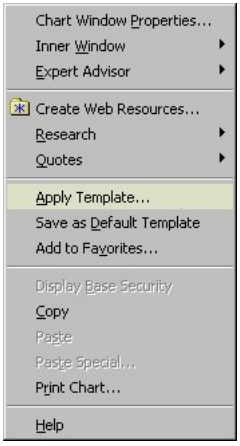
If the template was created from a single chart, then a chart is created when it is applied. The name in the affected chart's title bar will appear as "Chart*x*-Security Name" (where "*x*" is a number).

If the template was created from a multi-chart layout, then a layout is created when the template is applied. The name in each of the chart's title bars will appear as "Layoutx-Security Name:*x*" (where "*x*" in Layout refers to the layout number and "*x*" next to the Security Name is the chart's differentiating number).

This four chart layout was created after a four chart template was applied to a chart

As previously mentioned, when a template is applied to a chart, a new chart is created. However, the chart to which the template was applied remains on the screen. If you do not want the original chart to remain on the screen, check the Close all open charts box in the Apply Templates dialog.

A template can be applied to an open chart by right-clicking on the chart and selecting Apply Template from the shortcut menu.



You can also apply a template when creating a new chart or when opening Smart Charts by choosing **Options>** Open with Template from the menu in the New or Open dialogs.

Note: This option is disabled in the Open dialog if you don't have Smart Charts selected in the Files of Type drop-list.

If you find templates useful for your analysis, you may also want to try the Change Security commands (page 84).

To apply a template to an open chart

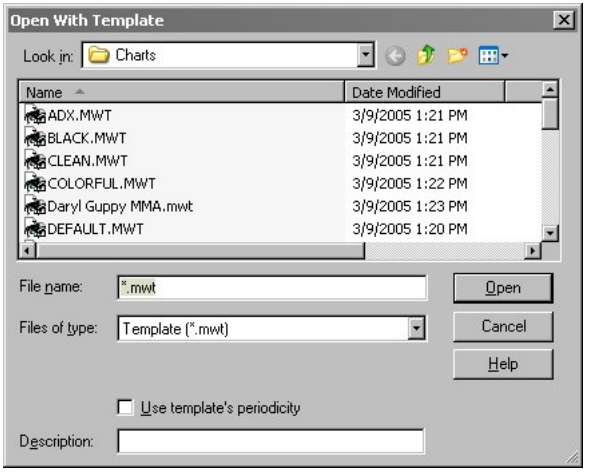
1. Right-click on the chart.
2. Choose Apply Template from the shortcut menu.
3. Choose the desired template from the Apply Template dialog.

To apply a template when loading a security

1. Choose Open or New from the File menu.
2. If you are opening an existing security with the Open dialog, select Smart Charts from the Files of Type drop-list.
3. Choose Open with Template from the Options menu.
4. Choose the desired template from the Open Template dialog. Click **Open**.
5. Choose the desired security. Click **Open**.

Open Template Dialog

You can apply a template to a security when loading by choosing Open with Template from the Options menu in the New or Open dialog. If you are in the Open dialog, this option is disabled if you don't have Smart Charts selected in the Files of Type drop-list.



Look in. Use the drop-list to select the drive for the folder of files you want to display in the list. Scroll through the folders until the folder containing the templates is listed.

File Name. The template you select from the list appears in this box. This is the template that will be opened and applied to the selected security.

References: For information on creating templates, see page 151.
For information on creating layouts, see page 136.

Making Changes to a Template

Changes are made to a template by opening (applying) the desired template, making the changes, and re-saving the template to the same file name.

To make changes to an existing template

1. Apply the template you want to change to a security or chart (page 149).
2. Make the desired changes.
3. Choose Save As from the File menu.
4. Choose Template from the Save as Type drop-list.
5. Double-click the name of the template file you are editing.

6. Click **Yes** when asked if you want to "replace the existing file."

Saving a Template

Templates are saved using the Save As command in the File menu. If you want the changes you have made to a template to be retained, you must save the template using the Save As command.

You can also save a template as the *default template*. The default template is automatically applied to all newly created charts.
For more information on the default template, see page 151.

To save a template

1. Choose Save As from the File menu.
2. Choose Template from the Save as Type drop-list.
3. If you are editing a template and want to save the changes to the same template name, double-click the name of the template file.
4. If you are saving a new template, type a name in the File Name box and click **Save**.

The Default Template

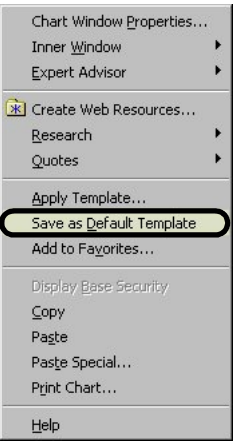
You can control how a newly created chart appears using the *default template*. The default template is a special template that is exactly like a regular template except that MetaStock automatically applies it to *newly* created charts. The default template that is shipped with MetaStock is just a single chart with high-low-close price bars and volume.

The default template is named `DEFAULT.MWT` and it is stored beneath the MetaStock program folder (i.e., `c:\Program Files\equis\MetaStock\charts`) along with your other templates. This means that the default template can be applied at any time just like a regular template.

For example, you could change the default template so that candlesticks and a moving average are always plotted when a new chart is created.

To quickly make the information in the currently selected chart the default template, right-click on the chart and choose Save as Default Template.

Click here to save the chart information as the default template



To edit the default template

1. Choose New from the File menu, and select Chart.
2. Double-click any security or chart listed in the dialog.
3. Make the desired changes to the chart.
4. Right-click on the chart and choose Save as Default Template from the shortcut menu.

Printing Charts and Data

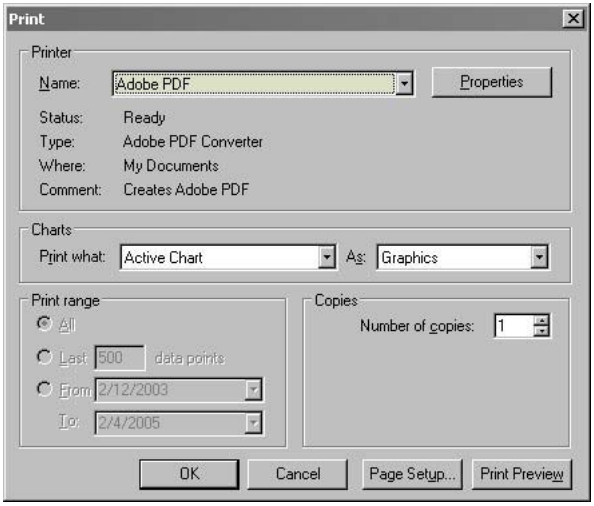
Introduction

MetaStock's Print command lets you print charts and the pricing data in charts. Before you can print, you must first select and configure your printer using the Print Setup dialog.

Selecting and Configuring Your Printer

MetaStock uses the default Windows printer selected from the Windows Printers folder. Direct access to your printer's properties dialog is available from within MetaStock via the Print menu.

To display the Properties dialog, open a chart, select Print from the File menu, and click the **Properties** button.



See your Windows manual for additional information on the controls in the Print Setup dialog.

To select and configure your printer

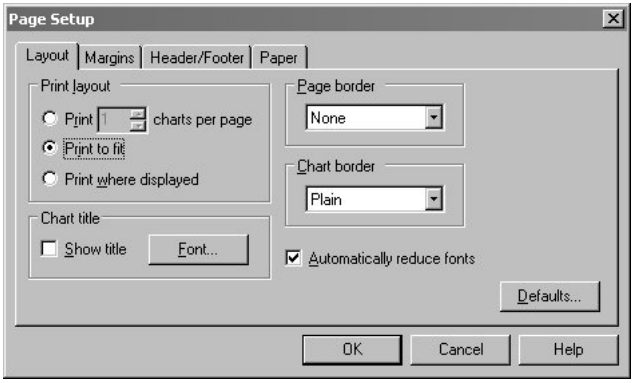
1. Choose Print from the File menu.
2. Choose the desired printer from the Name drop-list.
3. Click the **Properties** button if you need to change the printer's configuration settings.
4. Click the **OK** button.

Customizing the Printout with Page Setup

To control such things as paper size, margins, headers/footers, orientation, etc., use the Page Setup command in the File menu. Maybe you'd like your company name to appear at the top of every page and the date and time at the bottom. Or maybe you'd like a larger margin. All this and more can be controlled within the Page Setup dialog.

Layout

The Layout page is located in the Page Setup dialog.
Choose Page Setup from the File menu or from the Print dialog.



Print Layout. Select Charts per Page to specify the number of charts you want to appear on a page. For example, if you have eight charts open and you want the charts printed on two pages then type "*4*" in the Charts per Page box

- Choose Print to Fit to print all open charts on one page.
- Choose Print Where Displayed to print the charts in the same size and location as they appear on the screen.

Page Border. Choose the type of border to surround the page. The page border is printed at the specified margin settings.

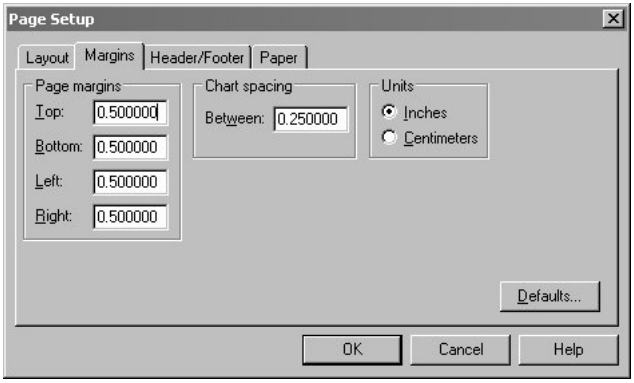
Chart Border. Choose the type of border to surround each chart.

Chart Title. Check this box if you want the information appearing in the chart title bar (page 110) to print. Click the **Font** button to choose the desired font for the chart title.

Automatically Reduce Fonts. Choose this box if you want the x- and y-axis fonts to be reduced in relation to the size of the chart. The smaller the chart, the smaller the font used. Leave the box unchecked if you want the fonts to remain at the specified sizes.

Margins

The Margins page is located in the Page Setup dialog.
Choose Page Setup from the File menu or from the Print dialog.



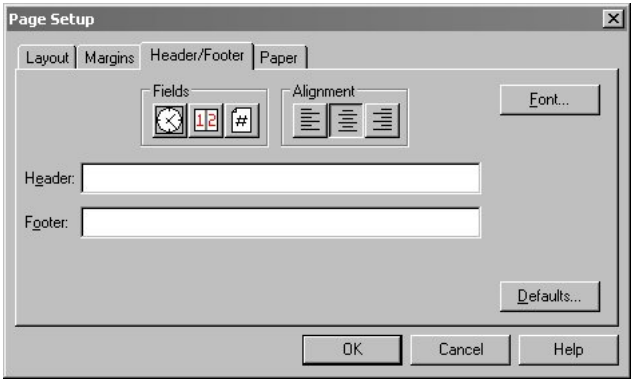
Page Margins. Specify the distance the chart should be printed from the top, bottom, left, and right sides of the page. The page border is printed directly against the margins.

Chart Spacing. Specify the distance between charts on the printout.

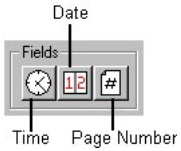
Units. Choose inches or centimeters to use for the margin and chart spacing measurements.

Header/Footer

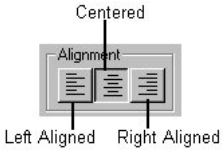
The Header/Footer page is located in the Page Setup dialog.
Choose Page Setup from the File menu or from the Print dialog.



Fields. Click on the time, date, or page number buttons to automatically insert the corresponding field into your header or footer.



Alignment. Click on the button that corresponds with the way you want both your header and footer aligned.



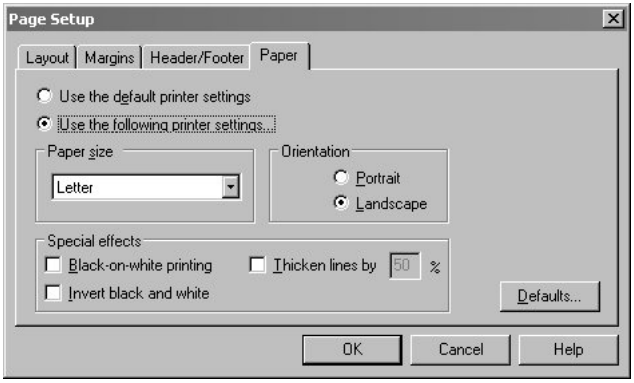
Header. Type the header to be printed at the top of the page.

Footer. Type the footer to be printed at the bottom of the page.

Fonts. Click this button to select the font for the header and footer. The Font dialog is used to select the font and the font's style, size, effect, and color. For more information on fonts, see page 246

Paper

The Paper page is located in the Page Setup dialog.
Choose Page Setup from the File menu or from the Print dialog.



Use the Default Printer Settings. Use the default settings already specified in the Windows Printer Properties for the selected printer.

Use the Following Printer Settings. Use the settings specified in this dialog.

Paper Size. Choose the size of paper (i.e., letter or legal) loaded in the printer's paper tray.

Orientation. Choose the orientation for your printout. Landscape prints horizontally on the page; portrait prints vertically on the page.

Black-on-White Printing. Check this box to print charts with a white background and black foreground. All background colors are printed as white; all foreground colors are printed as black.

Invert Black and White. Check this box if you want all black colors to print white and all white colors to print black.

Thicken Lines by. Check this box if you want all lines within a chart to print thicker by the specified percentage. This includes price plots, indicators, and line studies (excluding text). This setting also affects charts shared with other programs using the Copy and Paste commands (see page 11).

Previewing Charts Before Printing

Print Preview button

To see how a chart will appear when printed, use the Print Preview command in the File menu or click the Print Preview button on the toolbar. Print Preview will show you an exact replica of the printed chart on your computer screen. The Print Preview command is also available directly from the Print dialog.

The buttons along the top of the Print Preview screen allow you to print and change the view of the chart.

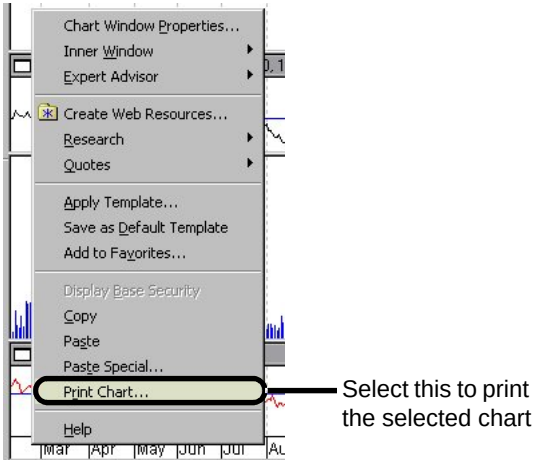
To preview a chart before printing

1. Select the chart you want to preview by clicking anywhere on the chart.
2. Make any desired changes at the Page Setup dialog.
3. Choose Print Preview from the Print dialog or the File menu.

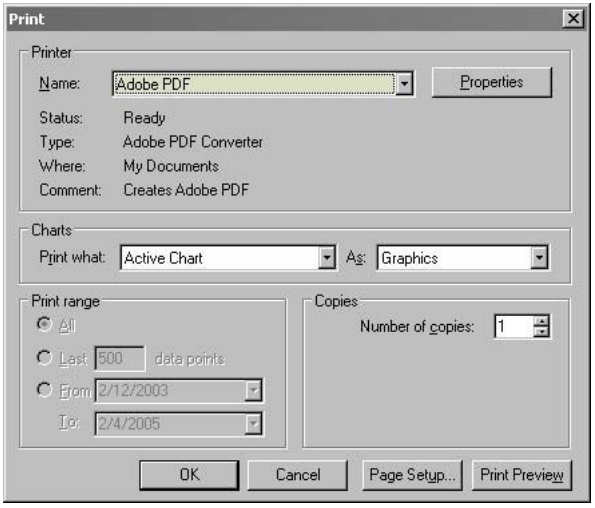
Printing Charts and Data

Print button

You print charts or data by using the Print command located in the File menu, by clicking the Print button on the toolbar, or by right-clicking on a chart and choosing Print Chart from the shortcut menu.



Before you can print, be sure that you have selected the correct printer. For more information, see page 153.



Name. Choose the desired printer from the drop-list. Only those printers that you have installed from within Windows will appear.

All open charts are listed at the bottom of the Window menu.

Print What. Choose what you want to print from this drop-list. Choose Active Chart to print the currently selected chart. Choose All Open Charts to print all charts currently open.

From the As box, choose whether you'd like the chart(s) printed in graphics or text. If you choose text, the Print Range options are made available.

Copies. Type the number of copies to print.

Print Range. If you have chosen to print Text, you can choose to print all or a specific range (by data points or dates). The values default to the amount of data loaded.

Page Setup. Choose this button to access the Page Setup dialog where you can specify the layout, margins, header/footer, and paper size. For more information, see page 154.

Print Preview. Choose this button to access the Print Preview screen. This lets you see exactly how the printout will appear on your screen. For more information, see page 158.

Properties. Choose this button to access the printer's Properties dialog where you can configure your printer. For more information, see page 153.

To print a chart

1. Select the chart you want to print by clicking anywhere on the chart.
2. Do one of the following:
   - Choose Print from the File menu.
   - Right-click on the chart and choose Print Chart from the Chart shortcut menu.
   - Click the **Print** button on the toolbar.
3. Click the Print What drop-list and select Active Chart.
4. Click the As box and select Graphics.
5. Click the **OK** button.

To print a chart's pricing data

1. Select the chart whose data you want to print by clicking on the chart.
2. Do one of the following:
   - Choose Print from the File menu.
   - Right-click on the chart and choose Print Chart from the Chart shortcut menu.
   - Click the **Print** button on the toolbar.
3. Click the Print What drop-list and select Active Chart.
4. Click the As drop-list and select Text.
5. Choose the desired Print Range.
6. Click the **OK** button.

To print multiple charts

1. Open the charts you want to print.
2. Do one of the following:
   - Choose Print from the File menu.
   - Right-click on the chart and choose Print Chart from the Chart shortcut menu.
   - Click the **Print** button on the toolbar.
3. Click the Print What drop-list and select All Open Charts.
4. Click the As drop-list and select Graphics.
5. Click the **OK** button.

Working with Price Plots

Introduction

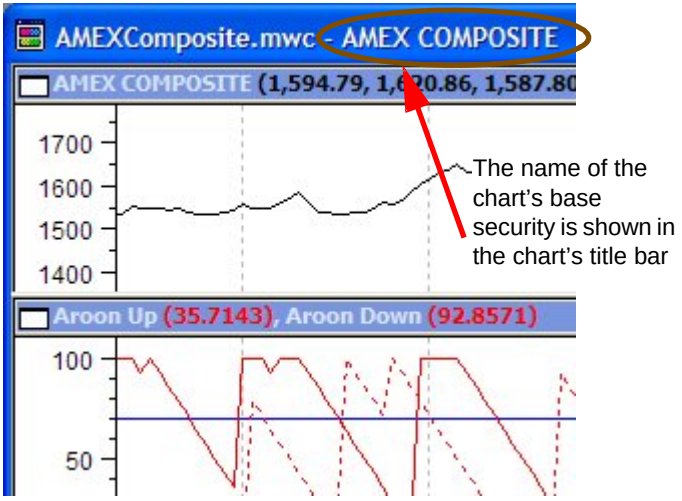
The primary focus of a chart is its price plot. Every chart consists of a base security. A base security is simply a security's pricing data.

There are nine different styles of displaying pricing data. Each of these styles uses one or more of the four basic pieces of pricing data— open, high, low, or close. Each of the nine styles has unique differences that can be interpreted in various ways.

Note: Some of the content referenced in this chapter may reference intraday functionality that is not available in the End-of-Day version of MetaStock.

Base Security Concept

Every chart has a base security. The base security is the security that was selected when the chart was originally created. All indicators plotted in a new inner window calculate on the chart's base security. The base security's name is displayed in the chart's title bar.



The base security of a chart can be changed by using the Change Security command in the File menu (page 84).

You can close the base security's inner window, but closing the inner window does not break the link to the base security.

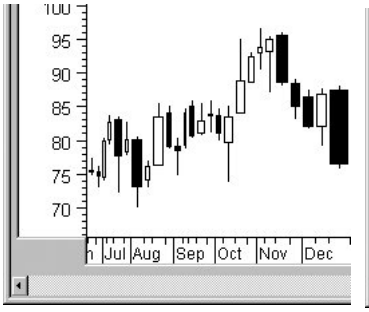
If you close the inner window of the base security or delete the base security and want to redisplay it, right-click on the chart and choose Display Base Security from the Chart shortcut menu. A new inner window will be created in which the base security will be plotted.

Although a chart has only one base security, pricing data for other securities can be displayed in inner windows within the same chart (page 179).

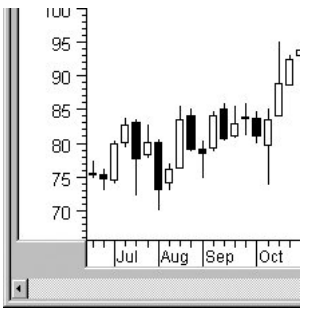
Types of Price Plots

MetaStock provides nine ways to view the pricing information: candlesticks, candlevolume, equivolume, Kagi, high/low/close bars, line, Point and Figure, Renko, and Three Line Break. The most common style of price plot is the high/low/close bar.

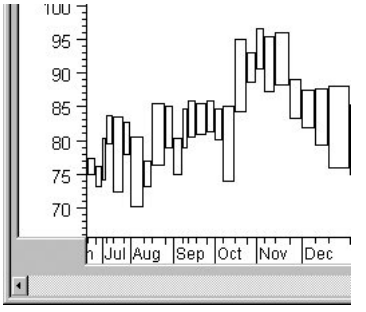
The following illustration shows the same security's data plotted in each of the nine styles.



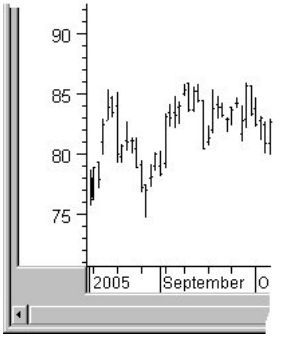
Candlevolume Chart



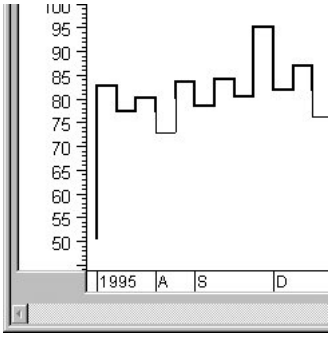
Candlestick Chart



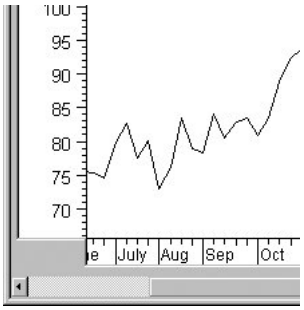
Equivolume Chart



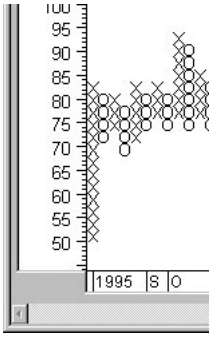
High/Low/Close Bar Chart



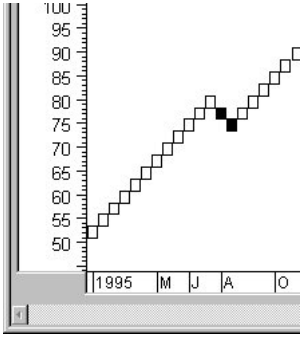
Kagi Chart



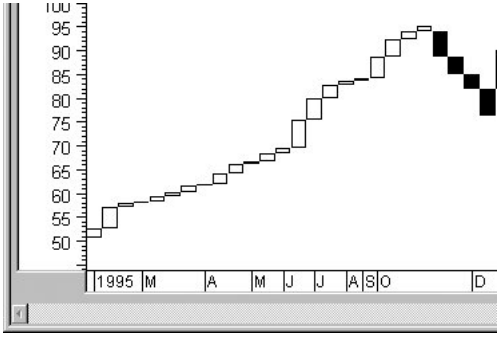
Line Chart



Point and Figure Chart



Renko Chart



Three Line Break Chart

Line charts require only closing prices to plot, whereas Candlesticks require all four pieces of pricing information— open, high, low, and close. And as their names imply, Equivolume and Candlevolume incorporate volume into the price plot.

Certain line studies (i.e., cycle lines, Gann grids, and Fibonacci Time Zones) plot unevenly on equivolume and candlevolume charts. This

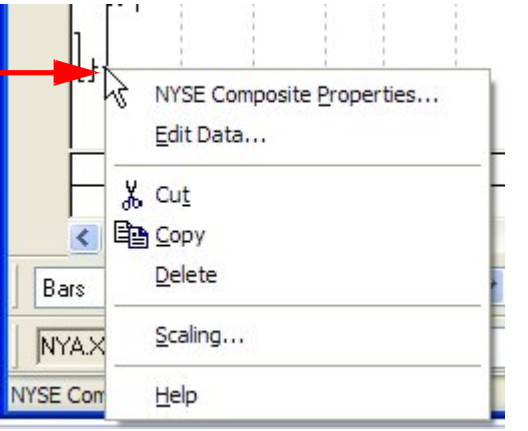
is because the distance between time periods on these charts varies. The same line studies, when plotted on Kagi, Point and Figure, Renko, and Three Line Break charts, also produce results inconsistent with normal interpretation.

Indicators calculated on Kagi, Point and Figure, Renko, and Three Line Break charts use all the data in each column and then display the average value of the indicator for that column.

Modifying a Price Plot

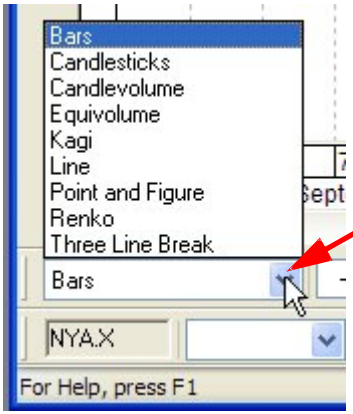
Price plots have several properties including style and color. The properties of a price plot are changed from the Price Plot's Properties dialog.

Right-click on a price plot to display its shortcut menu.



Right-click directly on the price plot and choose the Properties command to display the Properties dialog. You can also double-click on the price plot to bypass the shortcut menu and go directly to the Properties dialog. The Properties dialog can also be displayed by choosing Prices from the Format menu.

If you just want to change the line style of the price plot, the fastest way is to click directly on the plot to select it, and then choose the desired style from the Price Style QuickList on the Style toolbar.

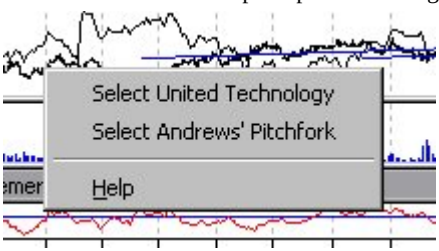


Click here to display the Price Style QuickList.

Ambiguity Menu

When you click on a plot (i.e., price, indicator, or line study), an "ambiguity" menu may appear if the plot you are clicking on is close to other plots. When plots are very close together, it is impossible for MetaStock to know which plot was clicked on. The illustration below shows the ambiguity menu that appeared because MetaStock didn't know whether the price plot or moving average was clicked.

You can also use the TAB *key to cycle through selectable objects on your chart.*



When the ambiguity menu appears, simply choose the desired plot from the menu.

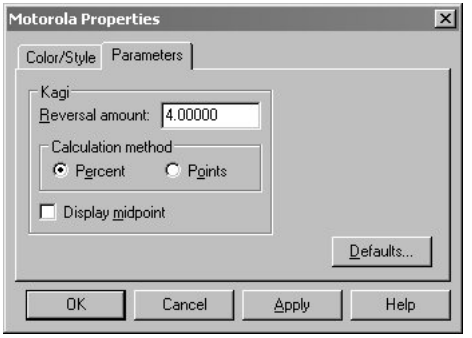
Parameters Page

The following sections explain the parameters for each of the price styles that require parameters (i.e., Kagi, Point and Figure, Renko, and Three Line Break).

To change a price plot's parameters

1. Do one of the following:
   - Right-click on the price plot and choose Properties.
   - Double-click on the price plot.
2. From the Parameters page of the Properties dialog, make the desired changes to the parameters.
3. Click the **OK** button.

Kagi



Reversal Amount. Enter the Reversal Amount to control when the direction of the Kagi chart changes. For example, if you enter a reversal amount of 2.00 points, the Kagi chart will change from up to down if there is a two point downward change in the closing prices. Likewise, it will change from down to up if there is a two point upward change in the closing prices. The length of time required to make the reversal does not matter.

Calculation Method. Choose one of the two calculation methods. Choose Percent if you want the reversal amount determined on a percentage basis (Example: a Reversal Amount of 2.00 requires a two percent change in the close to cause a reversal).
Choose Points if you want the reversal amount determined on a points basis (Example: a Reversal Amount of 3.00 requires a three point change in the close to cause a reversal).

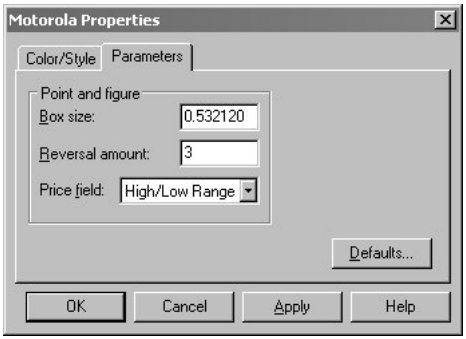
Display Midpoint. Choose Display Midpoint if you want a "tick" mark displayed at the midpoint of each of the up and down lines.

Notes

- Indicators calculated on Kagi charts use all the data in each column and then display the average value of the indicator for that column.
- For interpretation information on Kagi charts, see page 339.

Caution: Certain line studies, (i.e., Fibonacci Time Zones, Gann, cycle lines, etc.) produce results inconsistent with normal interpretation when plotted on Kagi charts.

Point and Figure



Box Size. Enter the Box Size (the size may contain a decimal portion, e.g., 1.33). The default box size is determined automatically depending on the price of the security being charted.

Note: Decreasing the "Box Size" value increases the number of boxes displayed.

Reversal Amount. Enter the Reversal Amount. This controls how many boxes the price must change to cause a reversal and move to the next column. For example, specifying 3 boxes per reversal when the box size is set to 2 will require that prices change 6 points (3 boxes times a box size of 2) before changing columns. Because the reversal is in boxes, the number may not contain a decimal portion. Larger reversal amounts cause fewer, taller columns.

Price Field. Choose the price field to use when plotting the Point and Figure chart. The default (High/Low Range) is recommended. When calculated on the High/Low Range, MetaStock takes into account the intraday extreme moves when drawing the boxes.

Notes

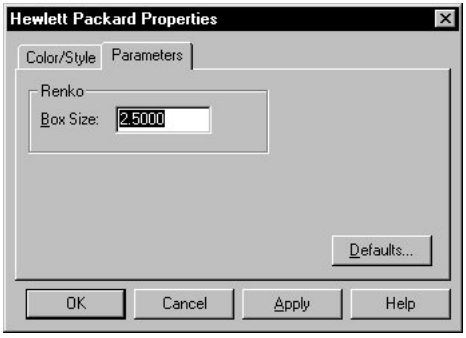
- A checkbox in the Chart Options page of the Application Properties dialog lets you specify if you want Point and Figure boxes to stay square when plotting a Point and Figure chart (page 43). Point and Figure charting purists to prefer to have

exactly square X and O marks. However, the advantage of leaving the box *unchecked* is that the Point and Figure charts will utilize chart space much more efficiently.

- The inner window title bar of a Point and Figure chart displays information about the chart. The first number is the Box Size and the second number is the Box Size *multiplied* by the Reversal Amount. The Price Field that a Point and Figure chart is based on is also identified in the title bar of the chart.
- Indicators calculated on Point and Figure charts use all the data in each column and then display the average value of the indicator in that column.
- For interpretation information on Point and Figure charts, see page 169.

Caution: Certain line studies, (i.e., Fibonacci Time Zones, Gann, cycle lines, etc.) produce results inconsistent with normal interpretation when plotted on Point and Figure charts.

Renko



Box Size. Enter the Box Size (the size may contain a decimal portion, e.g., 1.33). The default box size is determined automatically depending on the price of the security being charted.

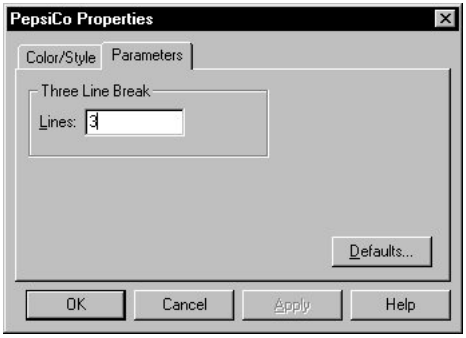
Note: Decreasing the "Box Size" value increases the number of boxes displayed.

Notes

- Indicators calculated on Renko charts use all the data in each column and then display the average value of the indicator in that column.
- For interpretation information on Renko charts, see page 387.

Caution: Certain line studies, (i.e., Fibonacci Time Zones, Gann, cycle lines, etc.) produce results inconsistent with normal interpretation when plotted on Renko charts.

Three Line Break



Lines. Enter the lines per break. The default is 3.

Note: Decreasing the "lines per break" value increases the number of blocks displayed.

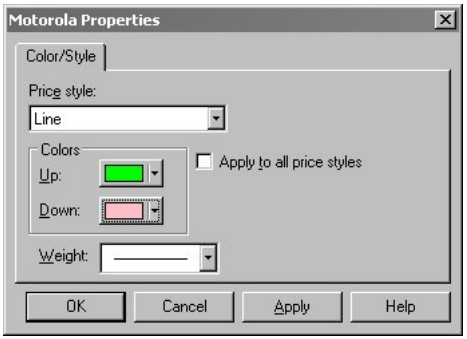
Notes

- Indicators calculated on Three Line Break charts use all the data in each column and then display the average value of the indicator in that column.
- For interpretation information on Three Line Break charts, see page 399.

Caution: Certain line studies, (i.e., Fibonacci Time Zones, Gann, cycle lines, etc.) produce results inconsistent with normal interpretation when plotted on Three Line Break charts.

Color/Style Page

The color/style page allows you to change the color, line style, and weight of the selected price plot. You can also make these changes by using the color and line style toolbars (page 31).



Price Styles. Click on the Price Style drop-list to display the nine price styles: Bars, Candlesticks, Candlevolume, Equivolume, Line, Kagi, Point and Figure, Renko, and Three Line Break.

Up. Use this drop-list to select the color when the closing price moves upward (as compared to the previous period's price).

Down. Use this drop-list to select the color when the closing price moves downward (as compared to the previous period's price).

Note: The Up and Down color settings only affect the currently selected Price Style. If an expert containing a Highlight (page 611) is attached to the chart, and its condition is true, the Highlight's color will override this setting.

Weight. Use this drop-list to select the weight (i.e., thickness) of the price plot.

Apply To All Price Styles. Check this box if you want the Up and Down colors selected for the current price style to apply to all Price Styles (rather than just the currently selected Price Style).

To change the style of the price plot

1. Double-click on the price plot in the chart.
2. From the Color/Style page, click the Price Styles drop-list.
3. Either
   - Choose the desired price style and click the OK button.
     or
   - Select the price plot in the chart.
4. Choose the desired price style from the Price Style QuickList located on the style toolbar.

To change the color of a price plot

1. Double-click on the price plot in the chart.
2. From the **Color/Style** page, click the Up drop-list.
3. Choose the desired color for upward price changes.
4. Click the Down drop-list.
5. Choose the desired color for downward price changes.
6. Either
   - Click **OK**.
     or
   - Select the price plot in the chart.
7. Choose the desired color from the color palette located on the style toolbar.

Updating and Editing a Price Plot's Data

The method you use to update and edit data depends on the type of data you are using — online data, real-time local data, or end-of-day local data (page 51).

To update online data, choose **View>** Refresh. The data will be re-collected from your online vendor, including any splits or adjustments that have occurred since you opened the chart.

IMPORTANT: ***Weekly and monthly charts do*** *not* ***update in real time.***

Real-time data is updated automatically as the trades occur. All you need to do is start MetaStock, which will then start the File and Data Servers. If your charts stop updating, there may be a problem with one of the servers (page 64).

To update your end-of-day downloaded data, use the Download Prices command in The DownLoader.

The DownLoader icon

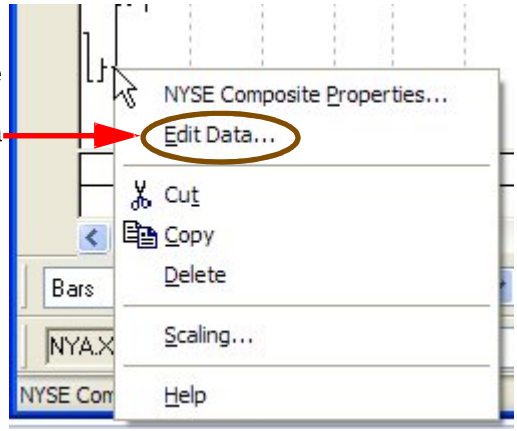
The DownLoader is a separate program provided with MetaStock. However, MetaStock provides seamless integration with The DownLoader, making data changes quick and easy.

You can run The DownLoader using the Windows Start command by going to the Equis International folder and choosing The DownLoader. Or you can run The DownLoader directly from within MetaStock by choosing The DownLoader from the Tools menu.

You can quickly access the data for an open chart by right-clicking on the price plot and choosing Edit Data from the shortcut menu. The security's datasheet will open in The DownLoader where you

can make the desired changes. This makes it easy for you to quickly edit an erroneous price on a chart.

Right-click on the price plot and choose Edit Data to open the instrument's datasheet.



If a chart for a security is open, changes made in The DownLoader to that security's attributes (i.e., name, ticker, units, etc.) will not be immediately reflected in the open chart. The chart must be closed and then reopened to reflect the changes. However, changes made to the pricing data itself (i.e., date, open, high, low, close, etc.) will be immediately reflected in the open chart.

Format Selected Object

This command allows you to modify the selected object. The object can be a price plot, indicator, or line study. An object is selected by clicking directly on the object. Small square handles appear on the object to let you know it is selected.

Copying, Deleting, and Moving Price Plots

Copying, moving, and overlaying price plots involves basic drag and drop techniques. Perhaps you want to see three computer stocks in the same chart. Or maybe you want to overlay several stocks in the same inner window.

"Moving" a price plot means to actually remove the selected price plot from its original location and move it to a new location. "Copying" means to make a copy of the selected price plot and place the copy in another location. "Deleting" a price plot means to remove the selected price plot from the chart, but this does not delete the data permanently from the security file.

Copying and Moving a Price Plot

You can copy any price plot from one inner window to another by selecting and dragging the price plot while keeping the CTRL key pressed, and then dropping it in a new location.

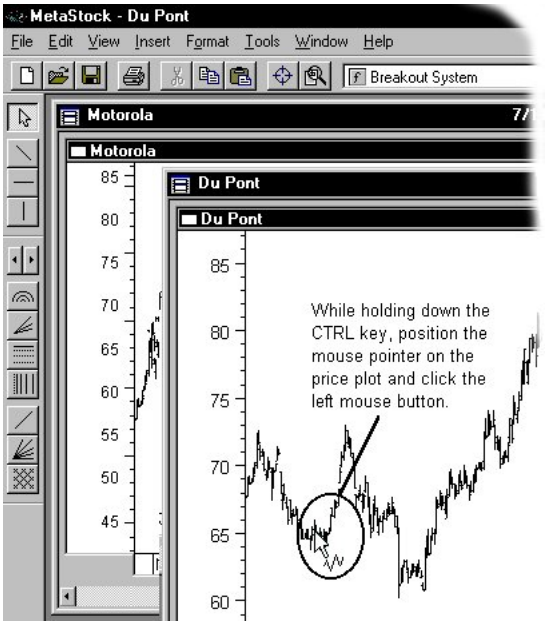
A price plot is moved from one inner window to another using the same procedure described in the previous paragraph, except that you don't need to hold the Ctrl key down. The only exception to this is if you attempt to move a base security price plot (page 163) from one chart to another. In this case the base security price plot is always copied. This prevents the accidental removal of a base security from its chart.

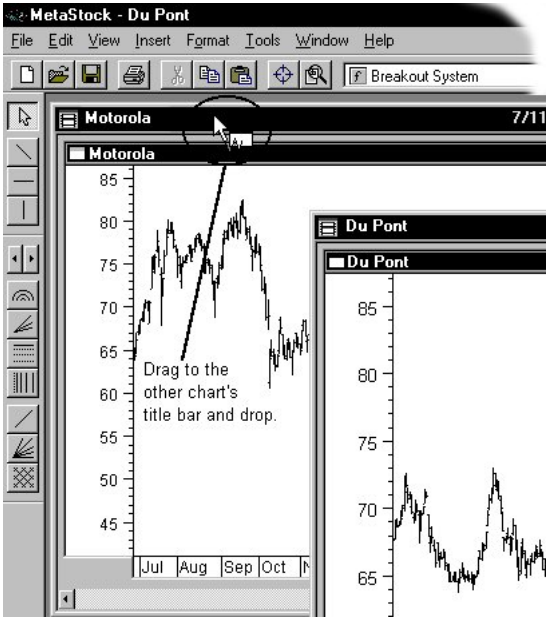
Note: When you click on a price plot, an "ambiguity" menu may appear if the plot you are clicking on is close to other plots (e.g., moving averages, trendlines, etc.). For more information on this menu, see page 167.

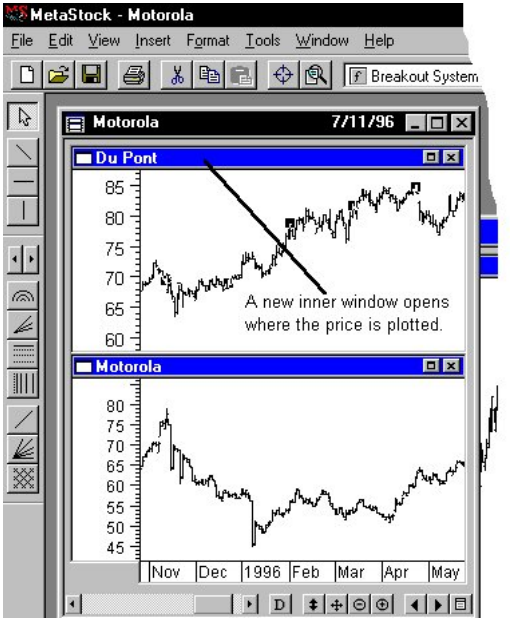
"Not" sign

A "not" sign appears next to the mouse pointer when dragging a price plot over an area where it cannot be dropped.

The following illustrations show how to copy a price plot from one chart to another. If the price plot is not the base security (see page 163), you can move the price plot by following the same procedure, except don't hold the CTRL key.







To copy or move a price plot to a new inner window

1. Open two charts.
2. Position the mouse over the price plot you want to copy or move.

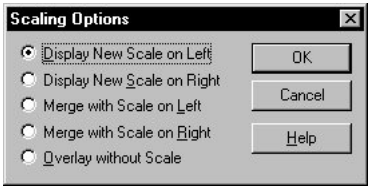
3. Hold the CTRL key down. Then click *and hold* the left mouse button and drag the price plot to the destination chart's title bar.
4. With the mouse still positioned over the destination chart's title bar, release the mouse button.

To overlay a price plot on an existing plot

1. Position the mouse over the price plot you want to copy or move.
2. Hold the CTRL key down (for copying only). Then click *and hold* the left mouse button and drag the price plot to the inner window containing the price plot or indicator you want to overlay on. The inner window can be in the same chart or a different chart.
3. Release the mouse button.
4. Choose the desired option from the Scaling Options dialog (see page 177) and click **OK**.

Scaling Options Dialog

When you copy or move a plot (i.e., price plot or indicator) to another inner window, it is likely that the other inner window's y-axis scale will not be compatible. If this is the case, MetaStock displays the Scaling Options dialog so that you can choose how to handle the scaling when the plot is overlaid.



Display New Scale on Left. Use a new scale on the left side of the chart that is compatible with the new plot. The existing plot will continue to display, but the left y-axis scale represents the new plot.

Display New Scale on Right. Use a new scale on the right side of the chart that is compatible with the new plot. The existing plot will continue to display, but the right y-axis scale represents the new plot.

Merge with Scale on Left. Adjust the existing left y-axis scale so that the new price plot can be represented.

Merge with Scale on Right. Adjust the existing right y-axis scale so that the new price plot can be represented.

Overlay without Scale. Overlay the plot without displaying a scale. You may want to do this if you are only concerned about comparing relative movements between the plots.

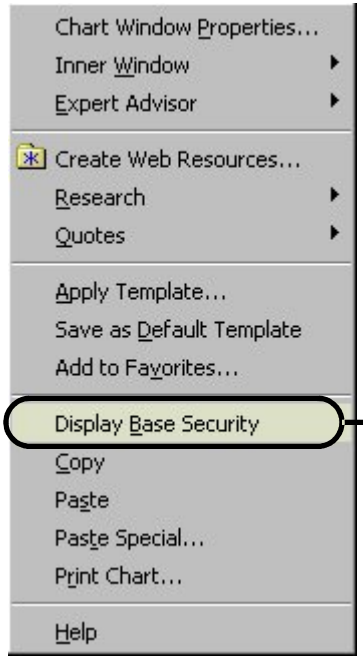
Deleting a Price Plot

Deleting a price plot from an inner window will remove the price plot and leave the inner window intact. For information on closing inner windows, see page 118.

You can delete the selected price plot by pressing the DEL key or by right-clicking on the price plot and choosing Delete from the shortcut menu. You are asked to confirm the deletion. An option in the Application Properties dialog (page 41) controls whether the Confirm Deletions dialog appears (page 17).

You can also delete price plots by using the Cut command from the Edit menu or the price plot's shortcut menu. However, the Cut command also copies the price plot to the Windows clipboard. For more information, see page 178.

If the price plot you delete is the chart's base security (see page 163), you can redisplay the base security by right-clicking on any inner window and choosing Display Base Security from the chart's shortcut menu. A new inner window will be opened at the top of the chart where the base security will be replotted.



To delete a price plot

1. Do one of the following:
   - Right-click on the price plot and choose Delete.

- Click the left mouse button on the price plot and press the DEL key.
- Select the price plot and choose Delete from the Edit menu.

2. Choose **Yes** when asked to confirm the deletion.

Confirm Deletions

When you delete price plots, indicators, or line studies from a chart, the Confirm Deletions dialog will appear (if you haven't disabled it).

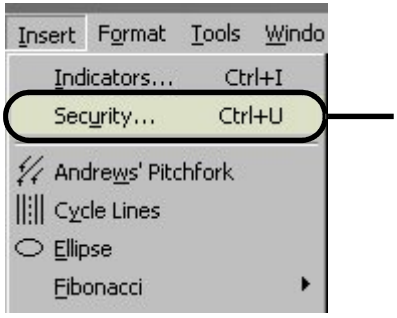
Choose **Yes** if you want the selected object deleted. Choose **No** to cancel the deletion.

You can prevent this message from appearing by checking the Don't display this message anymore box in this dialog or by unchecking the Confirm Deletion of Objects box in the Application Properties dialog (page 41).

Inserting Price Plots

Any security can be added to the current chart using the Insert Security command. This method is quicker than opening the chart and using drag and drop to copy the price plot.

To insert the price plot of a security that is not open, choose Security from the Insert menu.



If the periodicities are not the same, the data will be displayed in the best way possible.

Viewing Values on the Chart

There are two ways to view a plot's value in a chart. For a detailed, corroded view of the data, use the Data Window. For a quick inspection of the data for a particular bar, use ChartTips.

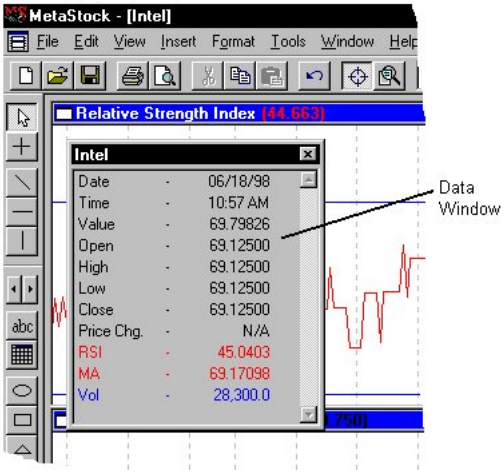
The Data Window displays the values at the location of the mouse pointer. You can display the base security's date, time, open, high, low, close, volume, open interest, price change from previous period, and indicator values. The Data Window displays the values for the chart that the mouse pointer is in. If the Data Window is docked, it will also display the ticker symbol.

Data Window button

The Data Window is displayed by choosing Data Window from the View menu, or by clicking the Data Window button on the toolbar.

The format of the price values displayed in the Data Window are either in decimal or fractions depending on the Units setting for the security. A security's Units setting is controlled with The DownLoader (page 74).

The color of the values displayed in the Data Window correspond to the color of the price plots represented. You can turn this "coloring" of text off from the Data Window Properties dialog (see page 182).



If you have multiple charts displayed on your screen, you can simply move the mouse from chart to chart and the Data Window will display the appropriate data.

When attempting to display the data for a specific bar, you may want to use your mouse to quickly move to the general area of the chart, and then switch to the keyboard's arrow keys to zero in on the specific bar.

The Data Window can be moved just like any window by clicking on the title bar and dragging. You can also resize the Data Window vertically by clicking on the bottom border and dragging.

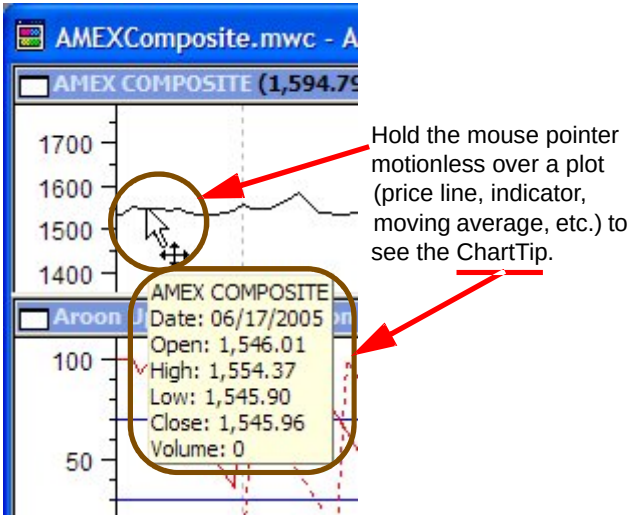
The active chart's ticker symbol appears in a docked Data Window.

You can dock the Data Window on the left or right side of the screen by clicking and dragging the Data Window to the desired side of the screen. Double-clicking anywhere on the Data Window will also dock it. After it is docked, double-clicking returns it to a floating window, or you can click and drag it to the desired location.

Note: When the Data Window is docked, the ticker symbol of the security in the active chart is displayed.

ChartTips allow you to quickly display the values for a particular bar without invoking any special command. By simply positioning the mouse over a plot (e.g., price bar, indicator, moving average, etc.) and holding the mouse pointer motionless for a second or so, a ChartTip displays, giving you information about the plot.

The first line of a ChartTip provides the name of the plot plus any parameters associated with that plot. The remaining lines provide other useful information about the plot.



To display the Data Window

Do one of the following:

- Choose Data Window from the View menu.
- Click the Data Window button on the toolbar.

To remove the Data Window

Do one of the following:

- Choose Data Window from the View menu.
- Click the Data Window button on the toolbar.
- Double-click the control menu box on the Data Window.
- Right-click on the Data Window and choose Remove Data Window.

To dock the Data Window

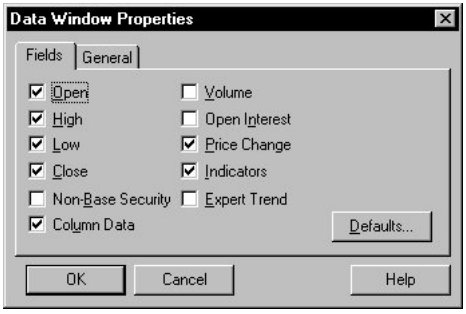
- Display the Data Window.
- Double-click anywhere on the Data Window. Or you can drag the Data Window until the mouse appears near the left or right edge of the screen. Release the mouse button to dock it.

To undock the Data Window

- Double-click anywhere on the Data Window. It will return to a floating window.

Changing the Properties of the Data Window

To specify the properties of the Data Window, use the Data Window Properties dialog. This dialog is accessed by right-clicking on the Data Window or by choosing Data Window from the Format menu.



Check the box next to the values you want displayed in the Data Window. Click on the General tab to access the following options:

- Check "Update Only On Drag" box if you would like the Data Window to update only when you are dragging the mouse (i.e., clicking and holding the left mouse button down).
- Check the "Display Data Window Text In Color" box if you would like the color of the values in the Data Window to correspond to the color of the represented plot.

To specify the contents of the Data Window

1. Choose Data Window from the Format menu.
2. Check the desired values to display in the Data Window Properties dialog.
3. Click the **OK** button.

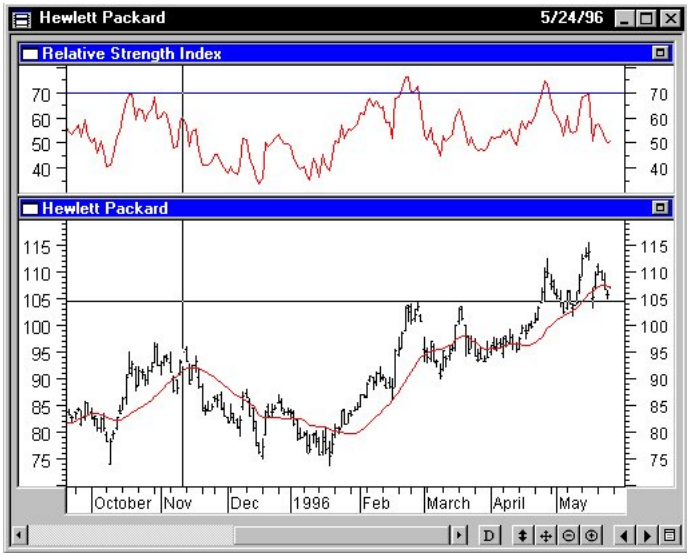
Visual Inspection Using the Crosshairs

Crosshairs button

The crosshairs are helpful when inspecting the relative moves of indicator and price plots. They are also good for spotting support/resistance levels (page 306). The crosshairs are turned on by choosing Crosshairs from the View menu or clicking the Crosshairs button on the trendline toolbar. You can turn off Crosshairs by pressing the Esc key, clicking the Crosshairs button on the toolbar, or choosing Crosshairs from the View menu.

You can select multiple indicators by holding down the CTRL *or* SHIFT *key as you make your selections.*

You may find the crosshairs helpful when you have the Data Window displayed so that you can see the exact location of all values shown in the Data Window. The mouse pointer disappears when crosshairs are displayed to allow better visibility of the underlying plot(s) at the intersection point.



Even when crosshairs are turned on, you still can use all the menus and toolbars. In fact, you may find it helpful to have the crosshairs displayed when drawing line studies (see page 186).

To turn on the crosshairs

Either

- Choose Crosshairs from the View menu. A checkmark will appear next to the menu item indicating they are turned on.

Crosshairs button

or

- Click the Crosshairs button from the toolbar.

Working with Line Studies

What is a Line Study?

Line studies are plots that you draw or place on a chart to help interpret price or indicator movement. Examples are trendlines, ellipses, Fibonacci Arcs, Gann Angles, vertical lines, etc. Although not officially designated as line studies, text and symbols are very similar to line studies in the way they are placed on a chart. Text and symbols are also covered in this chapter.

Every line study is an object containing its own set of parameters that can be accessed by right-clicking directly on the study.

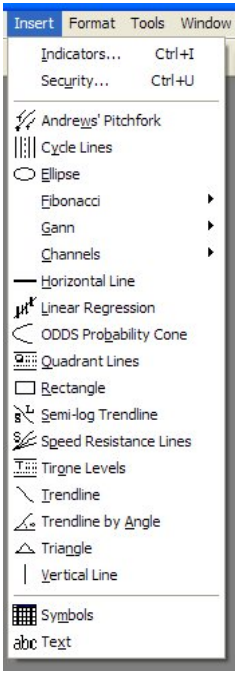
Most line studies are contained within a single inner window. However, some lines studies (e.g., cycle lines, Fibonacci Time Zones, and vertical lines) can span vertically across all inner windows within a chart.

There are two types of line studies— those that are line based and those that aren't. Line studies that are line based require you to click and drag a line between a starting and ending point to draw the line study. Those that aren't line based appear as soon as the mouse pointer is inside an inner window. A mouse click anchors the line study.

IMPORTANT: Linear Regression Lines, Quadrant Lines, Speed Resistance Lines, Raff Regression Channels, and Tirone Levels require *actual pricing data* to plot. When these line studies are plotted on Kagi, Point and Figure, Three Line Break, or Renko charts, they use all the data in all the columns.

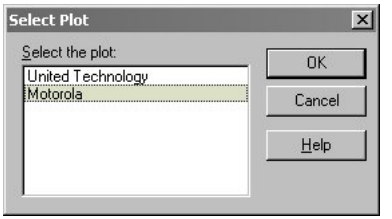
Drawing a Line Study

Line studies are drawn on a chart by either selecting the desired button on the appropriate drawing toolbar or by choosing the line study from the Insert menu.



Select Plot dialog

Line studies are attached to the closest plot to the mouse pointer when you first click to begin drawing. You can change the plot a line study is attached to from the Select Plot dialog. Right-click on the line study and choose Scaling to display the Select Plot dialog.

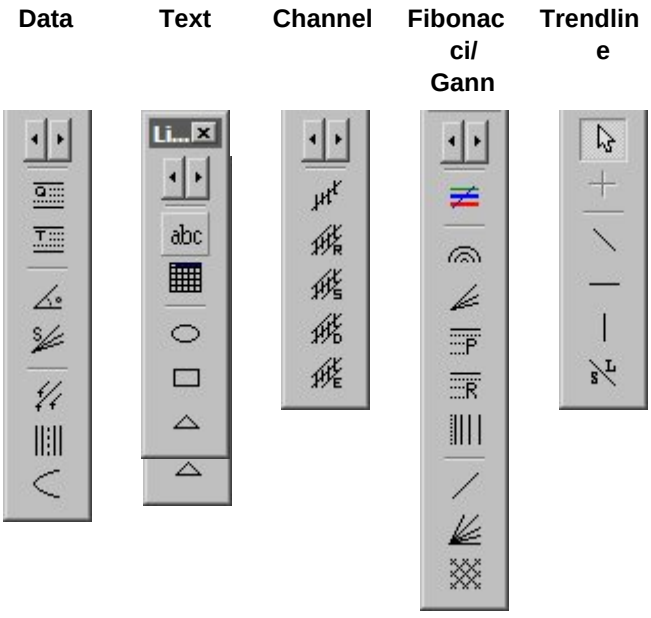


To draw a line study

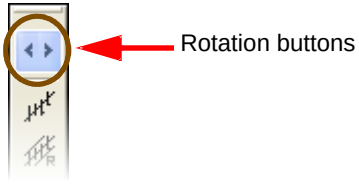
1. Choose the desired line study from the appropriate drawing toolbar or the Insert menu.
2. If the line study is trendline based, position the mouse at the starting point, *click and hold* the left mouse button, and drag the line study to an ending point.
3. If the line study is *not* trendline-based, simply position the mouse at the location you want to anchor it and click the left mouse button.

The Five Groups of Line Studies

Below are the five line studies toolbars:



The Studies toolbar combines the **Data**, **Text**, **Channel**, and **Fibonacci/Gann** groups of tools. Use the rotate buttons to rotate between these four groups of lines studies. The **Trendline** toolbar is always displayed.



Select Mode versus Drawing Mode

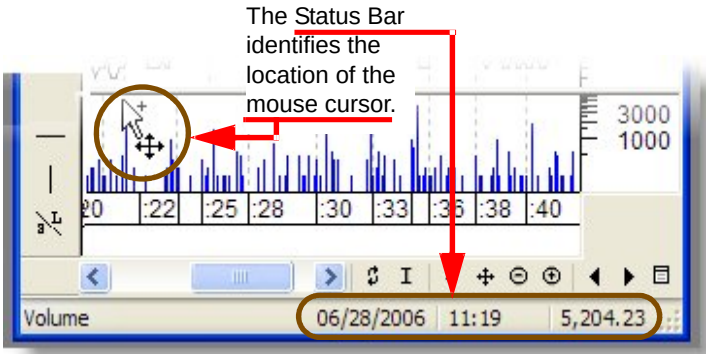
When you choose a line study, the mouse pointer changes appearance to indicate that you have switched from “select” mode to “drawing” mode. When you are in drawing mode, you can draw the chosen line study, but you cannot select other objects on the chart (e.g., price plots or line studies).

Select Mode button

To return to select mode after drawing a line study, click the Select Mode button on the trendline toolbar. An Application property (see page 41) controls whether you return to select mode immediately after drawing a line study or remain in drawing mode.

Helpful Feedback from the Status Bar

The status bar provides helpful feedback when drawing line studies. It tells you where the mouse pointer is positioned by showing the date/time and the y-axis value as you are drawing, which can be very helpful on a crowded chart.



Adjusting, Copying, Deleting, and Moving Line Studies

You can select multiple line studies for copying, moving, or deleting by holding down the SHIFT key as you click your left mouse button.

Just as price plots and indicators can be moved around using drag and drop techniques, so can line studies. Perhaps you want to copy a trendline to make parallel channels above and below the price plot.

Or maybe you'd like to adjust the range of the Fibonacci Retracements a bit. Or maybe you'd like to remove an old trendline from your chart. This can easily be done using common Windows techniques (i.e., click, drag and drop).

Sometimes when you are trying to click on a line study that is crowded among other plots, a pop-up "ambiguity" menu appears from which you can select the desired line study. For more information, see page 167.

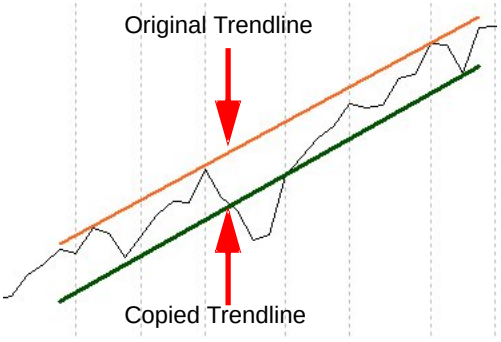
Copying and Moving Line Studies

Move cursor

Copying and moving a line study involves basic drag and drop techniques. The only difference between copying and moving is that you hold the CTRL key down when copying. When the mouse pointer is positioned over a line study, the mouse pointer displays a four-sided arrow (i.e., the move cursor) indicating that the line study can be moved. A line study can be dragged to a new location anywhere within the current chart or a different chart.

Notes

- When a line study (or any object) is being copied, a small plus sign appears next to the mouse pointer while dragging.
- When you drag a line study and drop it into an existing inner window, the Scaling Options dialog may appear prompting you to decide how to handle the scaling (see page 177).
- Copying a trendline is an excellent way to create channel lines above and below a price plot.



You can select multiple plots by holding down the SHIFT *key as you click.*

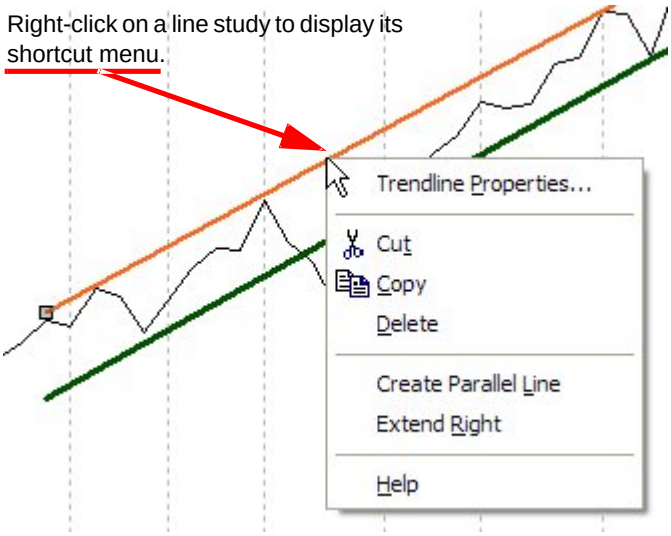
A unique characteristic of line studies is that they can be copied along with an indicator. For example, if you have a trendline drawn on an indicator, you can select both the indicator and trendline and drag them to a new location.

To move (or copy) a line study

1. Position the mouse over the line study you want to move or copy.
2. Hold the CTRL key down (for copying only).
3. Click *and hold* the left mouse button and drag the line study to another location within the inner window.
4. Release the mouse button.
5. Choose the desired option from the Scaling Options dialog (see page 177) and click **OK**.

Deleting Line Studies

You can delete a line study by right-clicking on the line study and choosing Delete from the shortcut menu. You can also delete a line study by selecting the line study and pressing the DEL key. An option in the Application Properties dialog (see page 41) controls whether or not you are asked to confirm the deletion.



If you want to quickly delete all line studies from a chart, choose Delete All from the Edit menu (see page 17).

To delete a line study

1. Position the mouse on the desired line study.
1. Click the right mouse button.
2. Choose Delete from the shortcut menu.

To delete all line studies from a chart

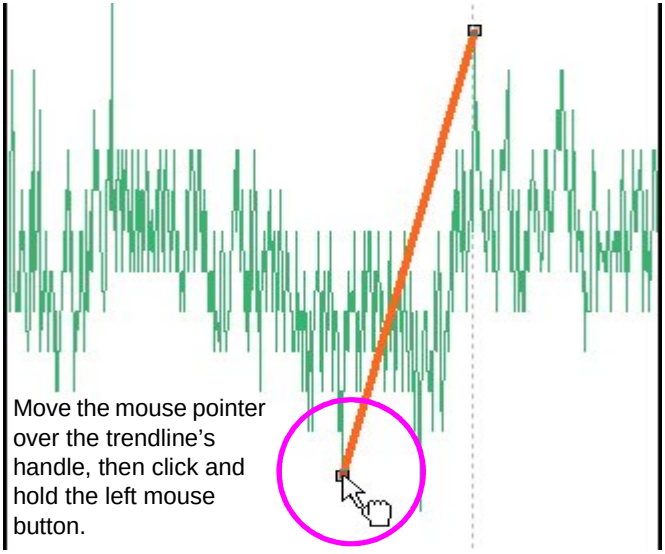
1. Select the chart from which you want to delete the line studies.
2. Choose Delete All from the Edit menu.
3. Click the Line Studies box and click OK.

Adjusting Line Studies

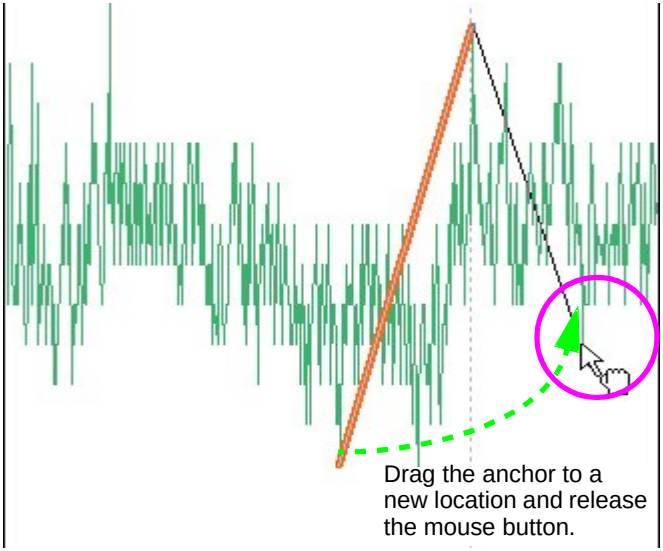
Line studies are adjusted directly on the chart by selecting the line study, positioning the mouse pointer over one of the square handles and dragging. When the mouse pointer is positioned on a handle, a closed hand appears next to the mouse indicating that the line study can be adjusted.

To adjust a line study

1. Position the mouse pointer over the line study you want to adjust and click the left mouse button.
2. Position the mouse pointer over one of the small square handles on the line study.



3. Click *and hold* the left mouse button and drag the handle to another location.



4. Release the mouse button.

Modifying a Line Study

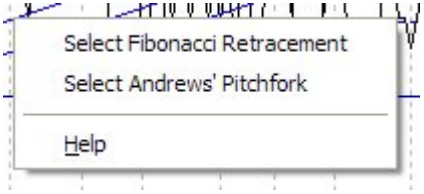
After a line study is drawn, you can modify any of its properties (e.g., start/end date, color, etc.) with the line study's Properties dialog. Line studies can also be copied or moved to a new inner window in the same chart or in a different chart. You can also reposition line studies.

A line study's Properties dialog can be accessed three ways:

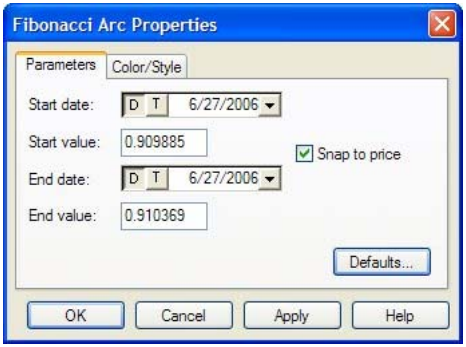
- You can right-click directly on the line study and choose Properties from the shortcut menu.
- You can double-click directly on the line study.
- You can click the line study to select it and then choose Selected Object from the Format menu.

You can press the TAB *key to cycle through all selectable objects on a chart.*

Note: When you are clicking (either double-clicking or right-clicking) on a line study and the line study is closely surrounded by other plots (i.e., prices, moving averages, etc.), an ambiguity menu may pop up prompting you to choose the desired line study.
For more information on this menu, see page 167.



The Fibonacci Arc Properties dialog is typical of many line studies:



To modify the properties of a line study

1. Position the mouse on the plotted line study and right-click.
2. Choose Properties.
3. Make changes using the line study's Properties dialog.
4. Click the **OK** button.

Line Study Parameters

To edit the parameters of any plotted line study, right-click on it and choose <Study Name> Properties from the menu that appears.

Properties Common to Many Line Studies

Every line study Properties dialog contains at least two tabs—Parameters and Color/Style. The Color/Style tab controls are identical for all line studies, but the Parameters tab controls change to match that line study. Several line studies also have an additional tab for controls specific to that study type. Clicking **Defaults...** on any tab in the dialog restores the default values *for that tab only.*

Dates, Times, and Values

Date and Time Values

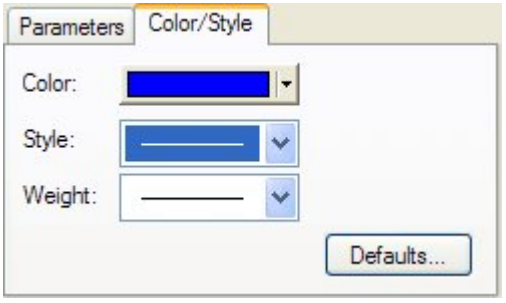
You can modify the date and time values for any line study by either typing in a new one or by selecting the line study and dragging the appropriate handle left or right. Click the "**D**" button to enter dates. Click the "**T**" button to enter times.

Numeric Values

You can modify the numeric value of a marked point in a line study by either typing in a new one or by selecting the line study and dragging the appropriate handle up or down.

Color/Style tab

This tab modifies the selected line study only. If you want to change the color/style for all new line studies, use the Default Colors & Styles command in the **Tools** menu (see page 244).



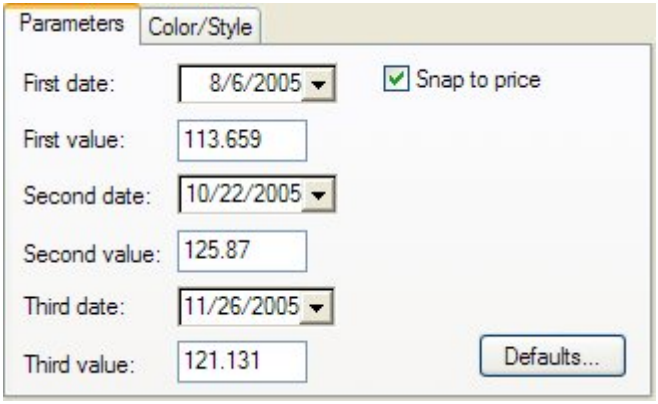
Parameter	Value
Color	This is used to choose the line study's color.
Style	This is used to choose the line study's line style.
Weight	This is used to choose the thickness of the line study. If you select a heavier weight, the Style will always appear as a solid line, although the line on the chart will have the pattern you selected.

You can also change the color and line style of the line study by using the color and line style toolbars (see page 31).

Andrews' Pitchfork

You can edit the properties of an existing Andrews' Pitchfork line study by right-clicking on it and choosing Andrews' Pitchfork Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
First date	The date/time of the first marked point.
First value	The y-axis value of the first marked point.
Second date	The date/time of the second marked point.
Second value	The y-axis value of the second marked point.
Third date	The date/time of the third marked point.
Third value	The y-axis value of the third marked point.
Snap to price	Check this box if you want the line study's end point to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the line study end point snaps to the high price if the pointer is above the price bar, and to the low price if the pointer is below the price bar. If the pointer is between the two bars, the end point snaps to the closest price.

Drawing Tip

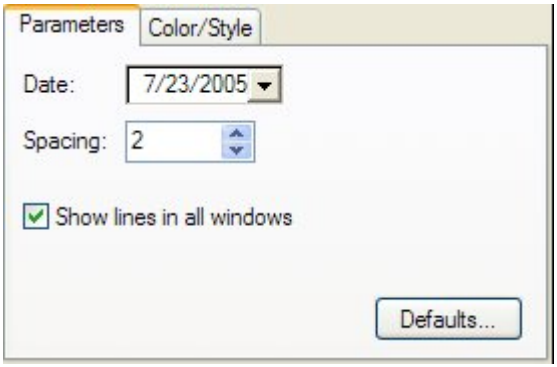
This line study requires that you mark three separate points on your chart. The first point is usually a major peak or trough on the left side of the chart. The second and third points are drawn at a major peak and major trough to the right of the first point.

References:
- For information on the other controls in this dialog, see page 194.
- For general information on line studies, see page 185.
- For interpretation information on Andrews' Pitchfork, see page 308.

Cycle Lines

You can edit the properties of a Cycle Lines line study by right-clicking on it and choosing Cycle Lines Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style. For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Date	This is the date/time on which the dotted "reference" line is drawn. The remaining cycle lines are drawn on either side of the reference line at the specified spacing interval.
Spacing	This is the number of periods between cycle lines. The initial spacing is set by positioning the mouse pointer at a starting point, then clicking and dragging until the lines are the desired distance apart.
Show lines in all windows	Check this box if you want the cycle lines to extend vertically across all inner windows within the chart.

Drawing Tip When drawing cycle lines, remember to click and drag the mouse to control the spacing of the cycle lines.

References:
- For general information on line studies, see page 185.
- For interpretation information on Cycle Lines, see page 321.

Dynamic Trend Price/Time Grid Study (DT Grid)

The DT Grid works in conjunction with Dynamic Trend Profile. Developed by industry guru Tom Joseph, Dynamic Trend Profile is an entirely new approach to technical analysis trading. The program is designed for Futures, Stocks, Forex and Options traders and presents a visual trading solution that focuses on managing trades. It shows you not only how to get into a trade, but also how to manage and predict what is going to happen next. Dynamic Trend Profile automatically calculates entry/stop levels and profit targets so that you're not left hanging once you're in the trade. No other software gives you this kind of insight.

The Dynamic Trend Price/Time Grid Study is designed to provide time and price support/resistance levels based on proprietary algorithms. The horizontal lines represent price levels and the angular lines represent time levels. The combination provides a very effective time/price grid.

Note: The Dynamic Trend Price/Time Grid Study is an added-cost study with a separate installation. If you have not installed this line study, its features will *not* be available to you.
Visit *www.equis.com/DTPriceTimeGrid* for subscription information for this tool.

To draw the grid:

1. Select the Line Drawing Tool (**DT Grid**) in MetaStock.
2. Click on the first bar that starts the swing/trend (PTA in the illustration following).
3. Click on the end bar of the swing/trend (PTB in the illustration).
   Once these points (PTA and PTB) are specified, the DT Grid study tool:
   - Identifies the lowest price point of the current retracement of the swing identified by the user. (PTD in the illustration)
   - Draws four horizontal lines* labeled Line A, Line B, Line C and Line D. These horizontal price levels represent various support levels for the current swing identified by the user.
   - Draws four sloping trend lines labeled Angle A, Angle B, Angle C and Angle D. These sloping trend lines represent the time levels where prices should find support for the current swing identified by the user.
   - Calculates two potential target (projection) levels using the momentum of the swing and the ensuing retracement and labels them as Projection A and Projection B.

*. See "Color Codes for Time & Price Lines" on page 199 for the color associations.

Reading the Study

- If the DT Grid time and price support levels hold, the prices are expected to trade to the projected targets.
- As long as the starting and ending bars of the swing you identified remain intact, the horizontal price levels and sloping trend lines do not change or need to be recalculated.
  However— if the retracement makes a new low and so changes the lowest price point (PTD), you will have to initiate a recalculation. When you do so, DT Grid will generate new A and B price projection lines using the new momentum of the swing and the ensuing retracement.

User Selectable Options:

In the study properties, the user can select from several options that are discussed below:

Control	Values	Description
Launch	ON or OFF Default = ON	When launch is set to ON, this will automatically launch and open an analysis window in DT Profile for the corresponding symbol and periodicity of the chart.

Control	Values	Description
Projection Only	ON or OFF Default = ON	When set to ON, only the Projection A and Projection B lines are drawn. When set to OFF, the price and time levels are also drawn.
Auto (not yet active)	ON or OFF Default = ON	This control is for future enhancements; changing it has no effect on the study.
Modifier (not yet active)	-5 to +5 Default = 0	This control is for future enhancements to the DT Grid study; changing it has no effect on the study.
Extend Right	0 or 1 Default = 0	When set to 0, all lines drawn are extended to the right by number of bars determined by the software. This mode is designed to be used when testing the theory of time and support lines on past swings where extending the lines all the way to the right would create unnecessary clutter on the chart. If the selection is 1, the lines will extend to the right past the last bar into the future, similar to Fibonacci Retracements (see page 209).
Study Recalc	ON or OFF Default = ON	Selecting this option causes all lines to be recalculated using the previously-identified swing/trend start and end bars.

Color Codes for Time & Price Lines

4 Horizontal Price Support Lines

- Horizontal line A is represented by light green
- Horizontal line B is represented by blue
- Horizontal line C is represented by red
- Horizontal line D is represented by dark green

4 Angular (sloping) Trend Lines

- Trendline A is represented by light green
- Trendline B is represented by blue
- Trendline C is represented by red
- Trendline D is represented by dark green

2 Projection Lines

- Projection line A is represented by dark magenta
- Projection line B is represented by light magenta

Additional Details And Examples

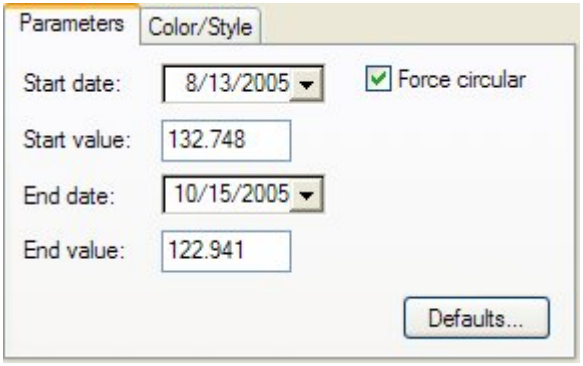
Visit *www.equis.com/DTPriceTimeGrid2* for:

- Educational videos on using this tool
- Additional information, including Stock, eMini and Forex examples

Ellipse

You can edit the properties of an existing Ellipse line study by right-clicking on it and choosing **Ellipse Properties** from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.
End date	The date/time of the second marked point.
End value	The y-axis value of the second marked point.
Force circular	Check this box if you want the ellipse to maintain a circular shape at all times (even when resizing).

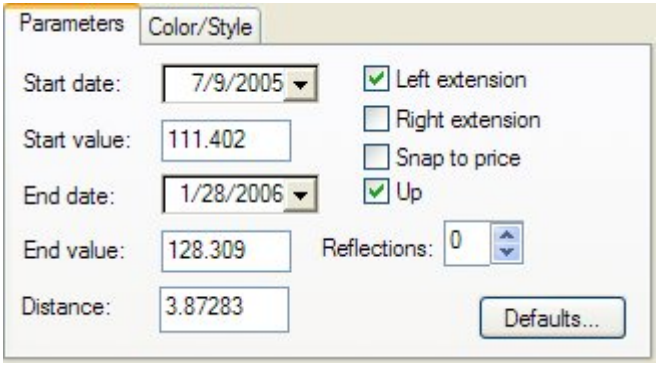
References:

- For information on the other controls in this dialog, see page 194.
- For general information on line studies, see page 185.

Equidistant Channel Trendlines

You can edit the properties of an existing Equidistant Channel Trendlines line study by right-clicking on it and choosing **Equidistant Channel Trendlines Properties** from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.
End date	The date/time of the second marked point.
End value	The y-axis value of the second marked point.
Distance	This is the distance between the two lines, expressed as a Y-axis value.
Left extension	Check this box if you want the lefthand end point of the line study to be automatically extended to the left edge of the chart.
Right extension	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.

Parameter	Value
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the mouse pointer is above the price bar, and to the low price when the mouse pointer is below the price bar. If the mouse pointer is between the high and low points, the end point will snap to the price it is closest to.
Up	Check this box if you want the channel to appear above the line you draw. When the box is blank, the channel appears below the line you draw.
Reflections	Select how many channels are to appear in addition to the first one you draw.

References:
- For information on the other controls in this dialog, see page 194.
- For general information on line studies, see page 185.

Fibonacci Lines

Background

Fibonacci numbers are a sequence of numbers in which each successive number is the sum of the two previous numbers:

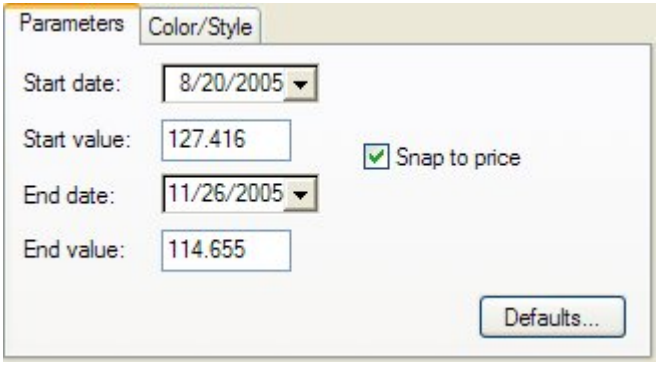
1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, etc.

These numbers possess an intriguing number of interrelationships, such as the fact that any given number is approximately 1.618 times the preceding number and any given number is approximately 0.618 times the following number.

Fibonacci Arcs

You can edit the properties of an existing Fibonacci Arcs line study by right-clicking on it and choosing **Fibonacci Arcs Properties** from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Drawing Tip Fibonacci Arcs are based on a trendline that you draw between a significant trough and peak. If the trendline is rising, the arcs will point upward; if the trendline is falling, the arcs will point downward.

Note: Fibonacci Arcs are drawn to appear circular on the average screen regardless of the number of periods displayed. This means the locations at which the arcs cross the data will vary depending on the number of periods displayed and the shape of the window; it also means that the arcs may appear oblong on some laptop computers.

Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.
End date	The date/time of the second marked point.
End value	The y-axis value of the second marked point.
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the line end is above the price bar, and to the low price when the line end is below the price bar. If the line end is between the high and low points, the end point will snap to the price it is closest to.

References:

- For information on the other controls in this dialog, see page 194.
- For interpretation information on Fibonacci Arcs, see page 330.
- For general information on line studies, see page 185.

Fibonacci Fans

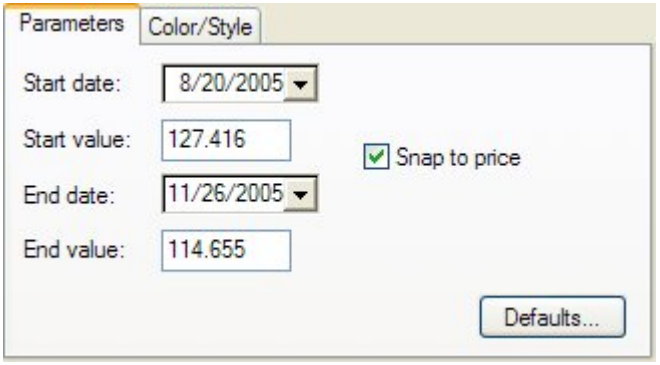
A Fibonacci Fan is displayed by drawing a trendline between two extreme points, for example, between a trough and an opposing peak. Then an "invisible" vertical line is drawn through the second extreme point. Three trendlines are then drawn from the first extreme point so that they pass through the invisible vertical line at the Fibonacci levels of 38.2 percent, 50.0 percent, and 61.8 percent. This technique is similar to the method used to calculate Speed Resistance Lines, see page 221 for more information.

Drawing Tip

Fibonacci Fans are based on a trendline that you draw between a significant trough and peak. If the trendline is rising, the fan lines point upward; if the trendline is falling, the fan lines will point downward.

You can edit the properties of an existing Fibonacci Fans line study by right-clicking on it and choosing **Fibonacci Fans Properties** from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.
End date	The date/time of the second marked point.
End value	The y-axis value of the second marked point.
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the line end is above the price bar, and to the low price when the line end is below the price bar. If the line end is between the high and low points, the end point will snap to the price it is closest to.

References:

- For information on the other controls in this dialog, see page 194.
- For interpretation information on Fibonacci Fans, see page 330.
- For general information on line studies, see page 185.

Fibonacci Projections

Fibonacci Projection lines are used to predict potential levels of resistance and support. By default nine horizontal lines are drawn showing the projection levels in the market after a consolidation or retracement. These lines are used to predict potential levels of resistance and support.

- MetaStock can display multiple Fibonacci Projection level lines.
- The default levels displayed are at: 0.0%, 23.6%, 38.2%, 50.0%, 61.8%, 100.0%, 161.8%, 261.8% and 423.6%.
- You can add, edit and delete individual lines in a projection.
- To calculate the Fibonacci Projection levels, you must identify three specific points in a market move:
  - **A**, the beginning of a move up or down, **B** and **C**.
  - In an uptrend, **B** is the highest point after **A** and **C** is the lowest point after **B**.
  - In a downtrend, **B** is the lowest point after **A**, and **C** the highest point after **B**.

  The total market move between **A** and **B** is then calculated, and the levels of the lines are then set according to three different ratio figures, using **C** as a starting level.

To select the points:

1. Click and hold on the first point (**A**, above).
2. Drag to the second point and release (**B**, above).
3. Click and releases on the third point (**C**, above).

Notes:

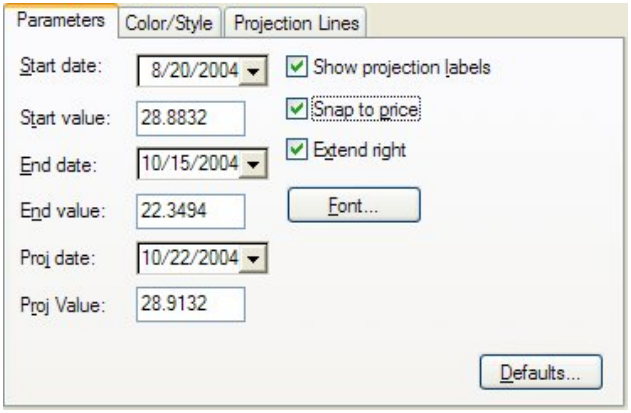
- If data point 2 (**B**) is greater than data point 1 (**A**), then the projection from point 3 (**C**) will be upwards.
- If **B** is *less* than **A** then the projection from **C** will be downwards.
- All projections begin at **C** with a value of 0%.
- You can display up to nine Fibonacci levels.
  The default levels are 0.0%, 23.6%, 38.2%, 50.0%, 61.8%, 100%, 161.8%, 261.8%, and 423.6%. The 0.0% and 100.0% lines are drawn solid, the others are drawn dashed.

Properties dialog

You can edit the properties of an existing Fibonacci Projections line study by right-clicking on it and choosing Fibonacci Projections Properties from the shortcut menu.

This dialog has three tabs: Parameters, Color/Style, and Projection Lines. For information on the Parameters or Projection Lines tabs, see below. For information on the Color/Style tab, see page 194.

Parameters Tab

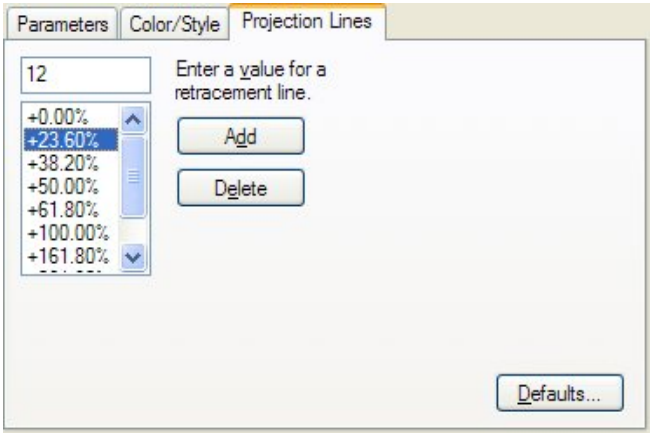


On this tab you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point. (A)
Start value	The y-axis value of the first marked point.
End date	The date/time of the second marked point. (B)
End value	The y-axis value of the second marked point.
Proj date	The date/time of the projection point. (C)
Proj value	The y-axis value of the projection point.
Show projection labels	Check this box if you want the percent labels to be displayed next to the projection lines.
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the mouse pointer is above the price bar, and to the low price when the mouse pointer is below the price bar. If the mouse pointer is between the high and low points, the end point will snap to the price it is closest to.
Extend Right	Check this box if you want the right-most end point of the line study to be automatically extended to the right edge of the chart.
Font…	Click this to open a standard Windows font selection dialog; this allows you to specify the font to be used for the labels.

Projection Lines Tab

MetaStock can display multiple Fibonacci Projection level lines. You can add, edit and delete these individual lines. The default levels displayed are at: 0.0%, 23.6%, 38.2%, 50.0%, 61.8%, 100.0%, 161.8%, 261.8% and 423.6%.



On this tab you can set the following parameters:

Parameter	Use
Level values	This box lists all level lines in this instance of the line study. You can only select one line value at a time.
Enter a value for a Fibonacci projection line	Use this box to edit or add lines. **Note:** The value of each level line must be unique.
Add	Click this button to create a new level line, using the value in the Level Value box.
Delete	Click this button to delete the selected line.
Defaults	Click this to restore the line values to their default levels (as noted above).

Adding a level line:

To add a new level, enter the percentage value for it in the text box next to Enter a value for a Fibonacci projection line and click **Add**.

Note: This button is disabled if there is no value in the text box.

Deleting a level line:

To delete a new level, select its value in the list and click **Delete**.

Note: This button is disabled if no line is selected.

Changing a level line:
To change the value of an existing line, select the line in the list and delete it, then add in a new line at the desired value.

References:
- For information on the other controls in this dialog, see page 194.
- For interpretation information on Fibonacci Projections, see page 330.
- For general information on line studies, see page 185.

Fibonacci Retracements

Retracement lines are used to predict potential levels of retracement following a market move. A Fibonacci Retracement trendline consists of several horizontal lines representing the retracement levels, set at percentages of the market move.

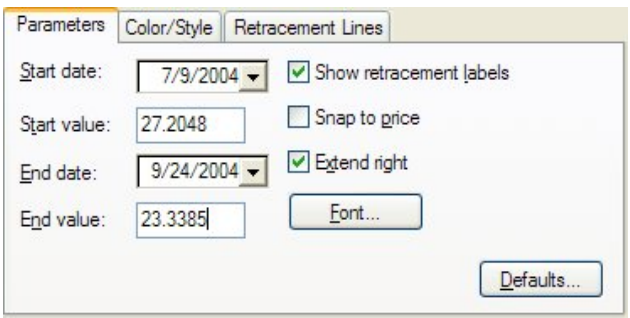
Retracement lines are constructed by identifying the two extremes of a market retracement. The center line is then drawn at the 50% level: a value mid-way between the two extremes. The other lines are drawn by default at the Fibonacci ratios 38.2% and 61.8% of the market move. You can change these values when constructing or editing the lines.

Properties dialog

You can edit the properties of an existing Fibonacci Retracements line study by right-clicking on it and choosing **Fibonacci Retracements Properties** from the shortcut menu.

This dialog has three tabs: Parameters, Color/Style, and Retracement Lines. For information on the Retracement Lines tabs, see below. For information on the Color/Style tab, see page 194.

Parameters Tab



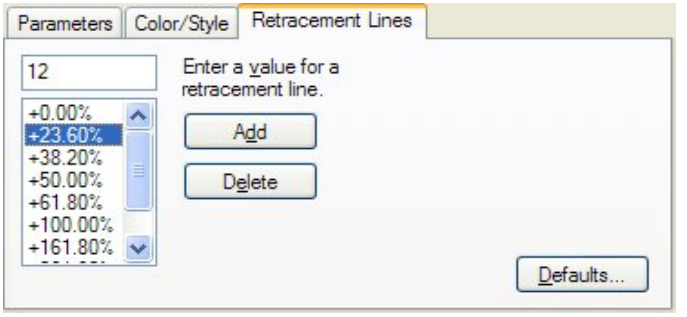
On this tab you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.

Parameter	Value
End date	The date/time of the second marked point.
End value	The y-axis value of the second marked point.
Show retracement labels	Check this box to display labels containing Fibonacci ratios (as percentages) for each line in the study next to the line.
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the line end is above the price bar, and to the low price when the line end is below the price bar. If the line end is between the high and low points, the end point will snap to the price it is closest to.
Extend right	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.
Font…	Click this to open a standard Windows font selection dialog; this allows you to specify the font to be used for the labels.

Retracement Lines Tab

MetaStock can display multiple Fibonacci Retracement level lines. You can add, edit and delete these individual lines. The default levels displayed are at: 0.0%, 23.6%, 38.2%, 50.0%, 61.8%, 100.0%, 161.8%, 261.8% and 423.6%.



On this tab you can set the following parameters:

Parameter	Use
Level values	This box lists all level lines in this instance of the line study. You can only select one line value at a time.

Parameter	Use
Enter a value for a retracement line	Use this box to edit or add lines. **Note:** The value of each level line must be unique.
Add	Click this button to create a new level line, using the value in the Level Value box.
Delete	Click this button to delete the selected line.
Defaults	Click this button to change the line values back to their default levels.

Adding a line:

To add a new level, enter the percentage value for it in the text box next to Enter a value for a retracement line and click **Add**.

Note: This button is disabled if there is no value in the text box.

Deleting a line:

To delete a new level, enter the percentage value for it in the text box next to Enter a value for a retracement line and click **Delete**.

Note: This button is disabled if no line is selected.

Changing a line:

To change the value of an existing line, select the line in the list and delete it, then add in a new line at the desired value.

Drawing Tip Fibonacci Retracements are based on a trendline that you draw between a significant trough and peak. If the trendline is rising, the retracement lines will project downward; if the trendline is falling, the retracement lines will project upward.

Note: The number of Fibonacci Retracement levels appearing on the chart depends on the range of the Y-axis. If you want to see all nine retracement levels, you may need to manually adjust the minimum and maximum values of the Y-axis (see page 125).

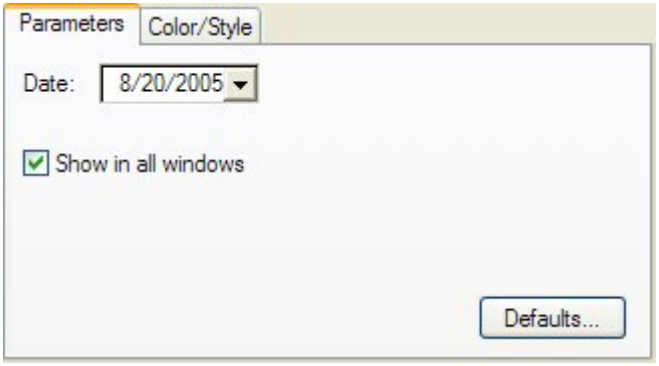
References:

- For information on the other controls in this dialog, see page 194.
- For interpretation information on Fibonacci Retracements, see page 330.
- For general information on line studies, see page 185.

Fibonacci Time Zones

You can edit the properties of an existing Fibonacci Time Zones line study by right-clicking on it and choosing Fibonacci Time Zones Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Date	This is the date/time on which the dotted "reference" line is drawn. The remaining time zone lines are drawn to the right of the reference line at the predefined Fibonacci intervals.
Show in all windows	Check this box if you want the time zones to extend vertically across all inner windows within the chart.

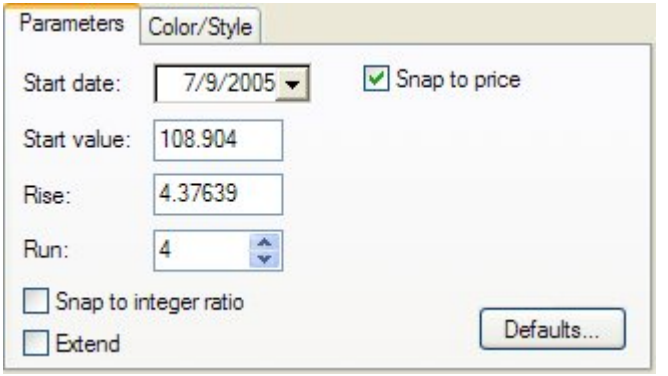
References:

- For information on the other controls in this dialog, see page 194.
- For interpretation information on Fibonacci Time Zones, see page 331.
- For general information on line studies, see page 185.

Gann Fans, Grids, and Lines

You can edit the properties of an existing Gann line study by right-clicking on it and choosing Gann <Type> Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.
Rise	This is the number of y-axis points to rise for every run interval.
Run	This is the number of time periods to run (extend) for every rise interval. To extend a Gann Line to the left, enter a negative value.
Snap to integer ratio	Check this box if you always want the ratio of the Rise and Run to be an integer value (i.e., 4 x 1, 3 x 1, 1 x 1, etc.).
Extend	Check this box to extend the Gann Line in both directions. **Note:** This control is not displayed for Gann Fans or Gann Grids.

Drawing Tip — To move a Gann line study, click and drag the anchor handle; to change the angle of the study; click and drag the other handle.

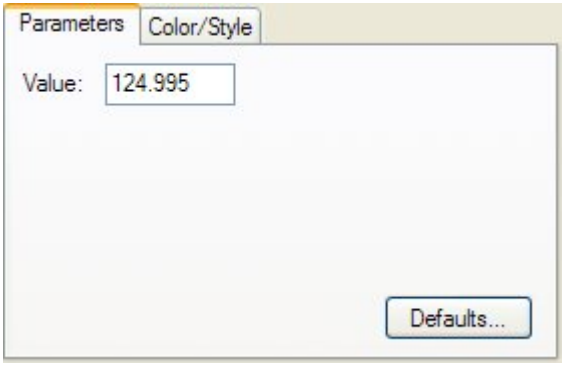
References:

- For information on the other controls in this dialog, see page 194.
- For interpretation information on Gann studies, see page 333.
- For general information on line studies, see page 185.

Horizontal Line

You can edit the properties of an existing Horizontal Line line study by right-clicking on it and choosing Horizontal Line Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Value	The y-axis value of the line.

Drawing Tip — Look at the y-axis value on the status bar to help you position your horizontal line at the desired position.

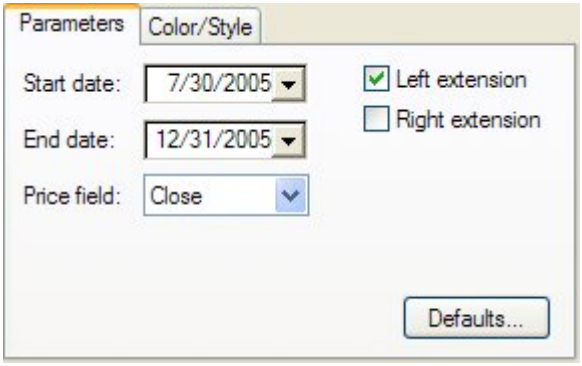
Reference:

- For information on the other controls in this dialog, see page 194.
- For general information on line studies, see page 185.

Linear Regression Trendline

You can edit the properties of an existing Linear Regression Trendline line study by right-clicking on it and choosing Linear Regression Trendline Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style. For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
End date	The date/time of the second marked point.
Price field	This is the price field (i.e., open, high, low, or close) to use when calculating the Linear Regression trendline.
Left extension	Check this box if you want the lefthand end point of the line study to be automatically extended to the left edge of the chart.
Right extension	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.

Note: Linear Regression Trendlines require actual pricing data to plot. When this line study is plotted on Kagi, Point and Figure, Three Line Break, or Renko charts, it uses all the data in all the columns.

Drawing Tip: You can easily draw a parallel line next to a Linear Regression line by choosing Parallel Trendline from the Linear Regression shortcut menu. The shortcut menu is displayed by right-clicking directly on the Linear Regression line plotted on the chart.

References:

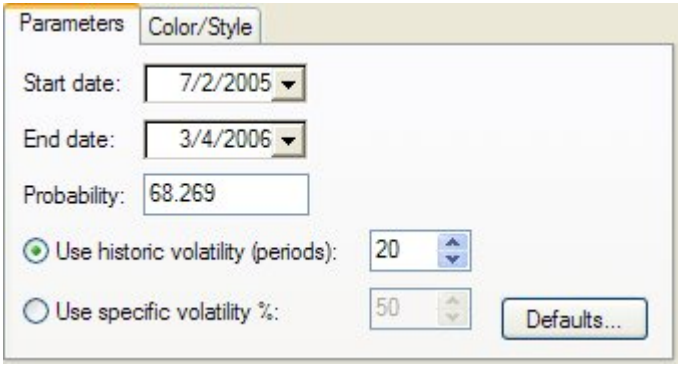
- For information on the other controls in this dialog, see page 194.
- For interpretation information on Linear Regression, see page 342.
- For general information on line studies, see page 185.

ODDS™ Probability Cones

Caution: A warning appears if you attempt to plot ODDS Probability Cones on a tick chart. This is because tick charts have an undeterminable number of periods in one year. However, if you compress the tick chart (1-minute, 5-minute, etc.) the cones will plot.

You can edit the properties of an existing Andrews' Pitchfork line study by right-clicking on it and choosing Andrews' Pitchfork Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style. For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
End date	The date/time of the second marked point.
Probability	The higher the percentage the wider the cones. The default value of 68.26% is equal to one standard deviation. Given the volatility, this means there is a 68.26% chance that prices will remain within the cones.

Parameter	Value
Use historic volatility	Choose this option if you want MetaStock to calculate the volatility over the number of periods specified in the box to the right. The calculation is based on the Bookstaber method— the same formula used by the Option Volatility indicator (page 265). You also can change the number of periods used in the calculation of the historic volatility directly on the chart by selecting the Probability Cones and then dragging the handles on the horizontal line protruding from the left of the cone's apex. **Note:** The width of the cones will fluctuate (due to changing volatility) if you choose this method and you drag the cones around the chart.
Use specific volatility	Choose this button if you want MetaStock to used a fixed volatility as specified in the box to the right. **Note:** The width of the cones will remain constant if you choose this method and you drag the cones around the chart.

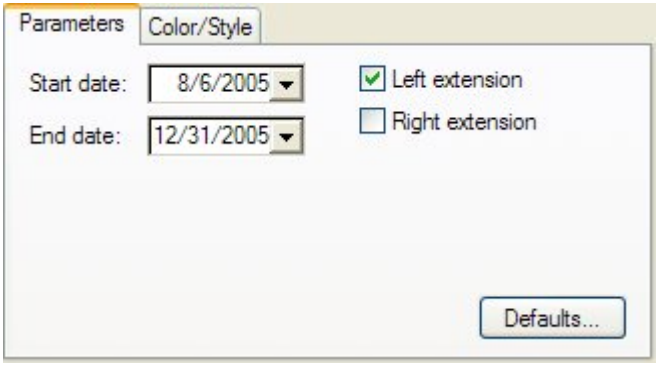
References:

- For information on the other controls in this dialog, see page 194.
- For interpretation information on ODDS Probability Cones, see page 359.
- For general information on line studies, see page 185.

Quadrant Lines

You can edit the properties of an existing Quadrant Lines line study by right-clicking on it and choosing Quadrant Lines Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below.
For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
End date	The date/time of the second marked point.
Price field	This is the price field (i.e., open, high, low, or close) to use when calculating the Linear Regression trendline.
Left extension	Check this box if you want the lefthand end point of the line study to be automatically extended to the left edge of the chart.
Right extension	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.

Note: Quadrant Lines require actual pricing data to plot. When this line study is plotted on Kagi, Point and Figure, Three Line Break, or Renko charts, it uses all the data in all the columns.

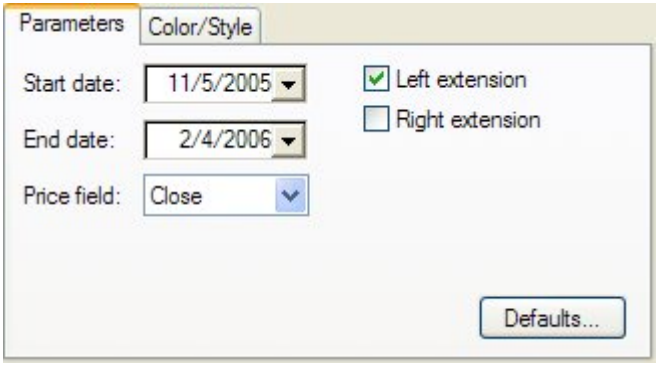
References:

- For information on the other controls in this dialog, see page 194.
- For information on the Select Plot dialog, see page 186.
- For interpretation information on Quadrant Lines, see page 377.
- For general information on line studies, see page 185.

Raff Regression Channels

You can edit the properties of an existing Raff Regression Channels line study by right-clicking on it and choosing Raff Regression Channels Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
End date	The date/time of the second marked point.
Price field	This is the price field (i.e., open, high, low, or close) to use when calculating the Linear Regression trendline.
Left extension	Check this box if you want the lefthand end point of the line study to be automatically extended to the left edge of the chart.
Right extension	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.

Drawing Tip: You can easily draw a parallel line next to a Raff Regression Channel by choosing Parallel Trendline from the Raff Regression Channel shortcut menu. The shortcut menu is displayed by right-clicking directly on the Raff Regression Channel plotted on the chart.

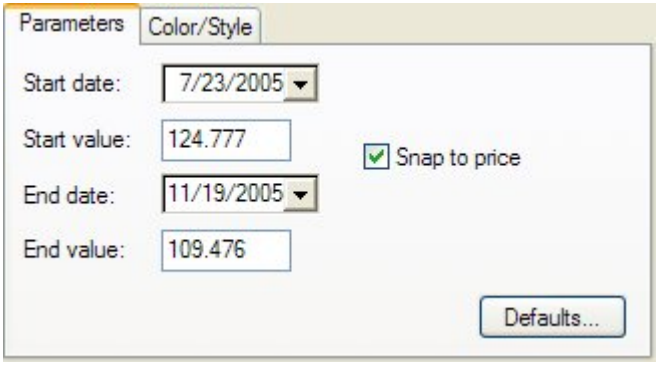
Note: Raff Regression Channels require actual pricing data to plot. When this line study is plotted on Kagi, Point and Figure, Three Line Break, or Renko charts, it uses all the data in all the columns.

References:
- For information on the other controls in this dialog, see page 194.
- For information on the Select Plot dialog, see page 186.
- For interpretation information on Raff Regression Channels, see page 379.
- For general information on line studies, see page 185.

Rectangle

You can edit the properties of an existing Rectangle line study by right-clicking on it and choosing Rectangle Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.
End date	The date/time of the second marked point.
End value	The y-axis value of the second marked point.

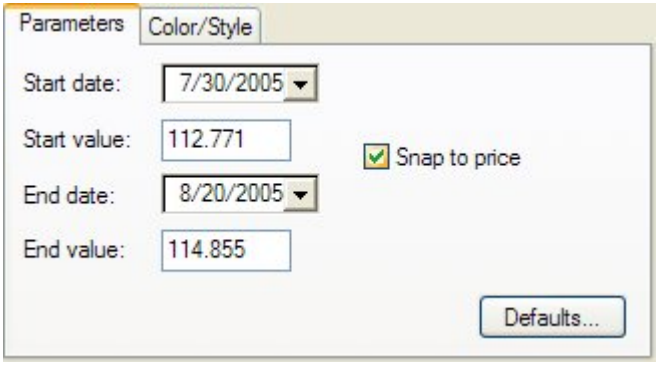
Parameter	Value
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the line end is above the price bar, and to the low price when the line end is below the price bar. If the line end is between the high and low points, the end point will snap to the price it is closest to.

References:
- For information on the other controls in this dialog, see page 194.
- For general information on line studies, see page 185.

Speed Resistance Lines

You can edit the properties of an existing Speed Resistance Lines line study by right-clicking on it and choosing Speed Resistance Lines Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.
End date	The date/time of the second marked point.
End value	The y-axis value of the second marked point.

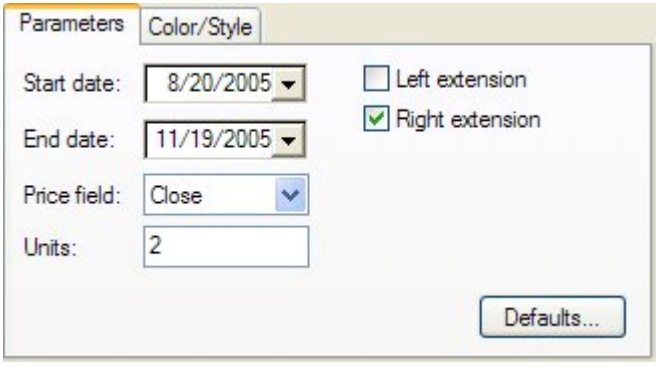
Parameter	Value
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the line end is above the price bar, and to the low price when the line end is below the price bar. If the line end is between the high and low points, the end point will snap to the price it is closest to.

References:
- For information on the other controls in this dialog, see page 194.
- For interpretation information on Speed Resistance Lines, see page 387.
- For general information on line studies, see page 185.

Standard Deviation Channel

You can edit the properties of an existing Standard Deviation Channel line study by right-clicking on it and choosing Standard Deviation Channel Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style. For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
End date	The date/time of the second marked point.

Parameter	Value
Price field	This is the price field (i.e., open, high, low, or close) to use when calculating the channel.
Units	This is the number of standard deviations to shift the upper and lower channel lines.
Left extension	Check this box if you want the lefthand end point of the line study to be automatically extended to the left edge of the chart.
Right extension	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.

Drawing Tip: You can easily draw a parallel line next to a Standard Deviation Channel by choosing Parallel Trendline from the shortcut menu. The shortcut menu is displayed by right-clicking directly on the Standard Deviation Channel plotted on the chart.

Note: A Standard Deviation Channel line study requires actual pricing data to plot. When this line study is plotted on Kagi, Point and Figure, Three Line Break, or Renko charts, it uses all the data in all the columns.

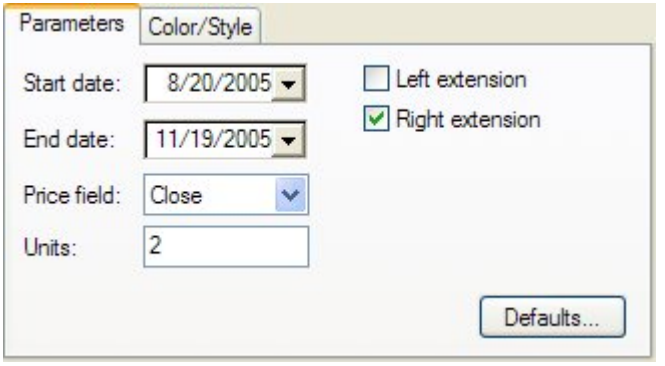
References:

- For information on the other controls in this page, see page 194.
- For information on the Select Plot dialog, see page 186.
- For interpretation information on Standard Deviation Channels, see page 389.
- For general information on line studies, see page 185.

Standard Error Channel

You can edit the properties of an existing Standard Error Channel line study by right-clicking on it and choosing Standard Error Channel Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style. For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
End date	The date/time of the second marked point.
Price field	This is the price field (i.e., open, high, low, or close) to use when calculating the channel.
Units	This is the number of standard deviations to shift the upper and lower channel lines.
Left extension	Check this box if you want the lefthand end point of the line study to be automatically extended to the left edge of the chart.
Right extension	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.

Drawing Tip: You can easily draw a parallel line next to a Standard Error Channel by choosing Parallel Trendline from the shortcut menu. The shortcut menu is displayed by right-clicking directly on the Standard Error Channel plotted on the chart.

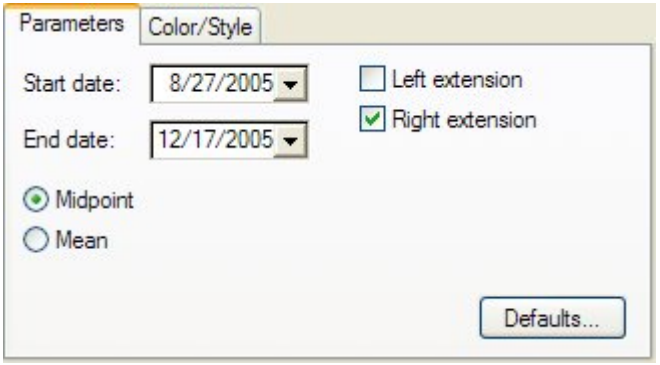
Note: A Standard Error Channel line study requires actual pricing data to plot. When this line study is plotted on Kagi, Point and Figure, Three Line Break, or Renko charts, it uses all the data in all the columns.

References:
- For information on the other controls in this page, see page 194.
- For information on the Select Plot dialog, see page 186.
- For interpretation information on Standard Error Channels, see page 392.
- For general information on line studies, see page 185.

Tirone Levels

You can edit the properties of an existing Tirone Levels line study by right-clicking on it and choosing Tirone Levels Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
End date	The date/time of the second marked point.
Price field	This is the price field (i.e., open, high, low, or close) to use when calculating the channel.
Midpoint	The Midpoint calculation method for a Tirone Levels study has three lines which divide the highest high and lowest low of the range into symmetrical segments.
Mean	The Mean calculation method for a Tirone Levels study displays five lines ranging between the extreme high and lows and the adjusted mean price.

Parameter	Value
Left extension	Check this box if you want the lefthand end point of the line study to be automatically extended to the left edge of the chart.
Right extension	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.

Drawing Tip When using the Mean method, it is common for the extreme high and/or the extreme low to be so extreme that they do not display with the current scale. Before displaying Mean Tirone Levels, you may want to change the y-axis scaling (page 127) so that all of the Tirone Levels are visible.

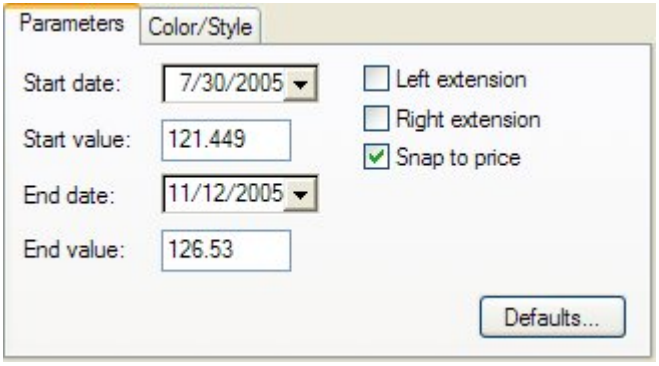
Note: A Tirone Levels line study requires actual pricing data to plot. When one is plotted on Kagi, Point and Figure, Three Line Break, or Renko charts, it uses all the data in all the columns.

References:
- For information on the controls in this page, see page 194.
- For general information on line studies, see page 185.
- For information on the Select Plot dialog, see page 186.
- For interpretation information on Tirone Levels, see page 401.

Trendline

You can edit the properties of an existing Trendline line study by right-clicking on it and choosing Trendline Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style. For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.
End date	The date/time of the second marked point.
End value	The y-axis value of the second marked point.
Left extension	Check this box if you want the lefthand end point of the line study to be automatically extended to the left edge of the chart.
Right extension	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the line end is above the price bar, and to the low price when the line end is below the price bar. If the line end is between the high and low points, the end point will snap to the price it is closest to.

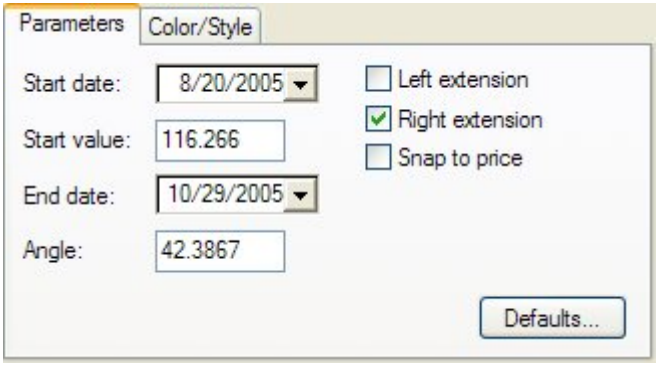
References:

- For information on the controls in this dialog, see page 194.
- For interpretation information on trendlines, see page 194.
- For general information on line studies, see page 185.

Trendline by Angle

You can edit the properties of an existing Trendline by Angle line study by right-clicking on it and choosing Trendline by Angle Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Start date	The date/time of the first marked point.
Start value	The y-axis value of the first marked point.
End date	The date/time of the second marked point.
Angle	The angle (in degrees) of the trendline.
Left extension	Check this box if you want the lefthand end point of the line study to be automatically extended to the left edge of the chart.
Right extension	Check this box if you want the righthand end point of the line study to be automatically extended to the right edge of the chart.
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the line end is above the price bar, and to the low price when the line end is below the price bar. If the line end is between the high and low points, the end point will snap to the price it is closest to.

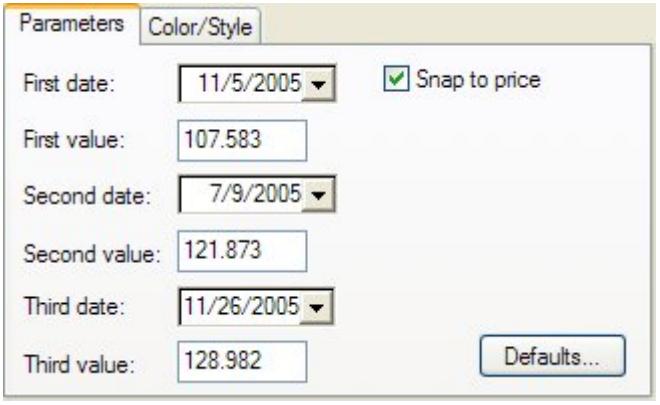
Drawing Tip When using the Trendline by Angle line study, the angle of the trendline is shown and continually updated on the status bar (page 33).

References:
- For information on the controls in this page, see page 194.
- For interpretation information on trendlines, see page 194.
- For general information on line studies, see page 185.

Triangle

You can edit the properties of an existing Triangle line study by right-clicking on it and choosing Triangle Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
First date	The date/time of the first marked point.
First value	The y-axis value of the first marked point.
Second date	The date/time of the second marked point.
Second value	The y-axis value of the second marked point.
Third date	The date/time of the third marked point.
Third value	The y-axis value of the third marked point.

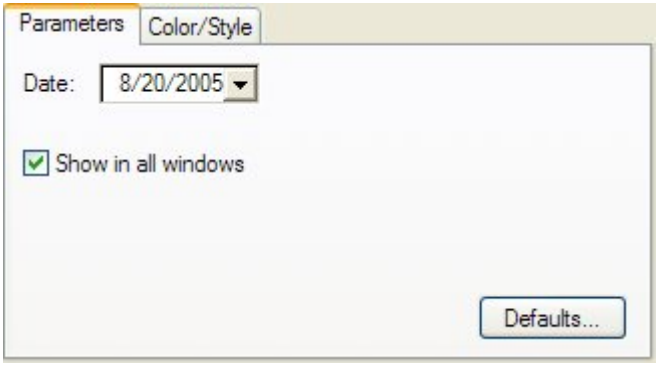
Parameter	Value
Snap to price	Check this box if you want the line study's ending points to automatically snap to the open, high, low, or close prices when plotting and dragging. **Note:** When this is active, the end point of the line study snaps to the high price if the line end is above the price bar, and to the low price when the line end is below the price bar. If the line end is between the high and low points, the end point will snap to the price it is closest to.

Reference:
- For information on the other controls in this dialog, see page 194.
- For general information on line studies, see page 185.

Vertical Line

You can edit the properties of an existing Vertical Line line study by right-clicking on it and choosing Vertical Line Properties from the shortcut menu.

This dialog has two tabs: Parameters and Color/Style.
For information on the Parameters tab, see below. For information on the Color/Style tab, see page 194.



Parameters Tab

For this line study, you can set the following parameters:

Parameter	Value
Date	This is the date/time on which the dotted "reference" line is drawn. The remaining time zone lines are drawn to the right of the reference line at the predefined Fibonacci intervals.

Parameter	Value
Show in all windows	Check this box if you want the line to extend vertically across all inner windows within the chart.

References:
- For information on the other controls in this dialog, see page 194.
- For general information on line studies, see page 185.

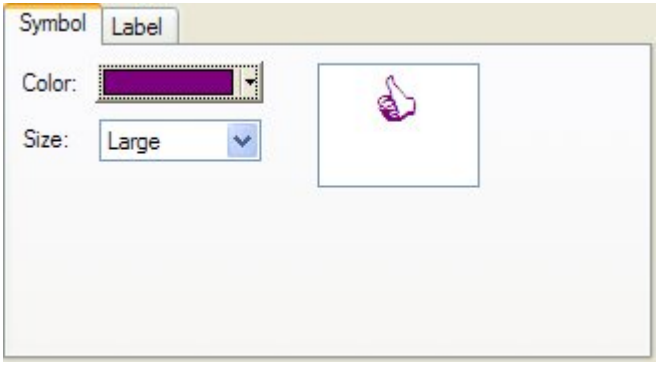
Drawing Tips
- Look at the date on the status bar to help you position your vertical line at the desired position.
- The inner window in which the vertical line is displayed is determined by where the vertical line was dropped (i.e., the inner window the mouse pointer was in).

Symbol

You can edit the properties of an existing Symbol by right-clicking on it and choosing Symbol Properties from the shortcut menu.

This dialog has two tabs: Symbol and Label. For information on these tabs, see below. For Symbols you can set the following parameters:

Symbol Tab



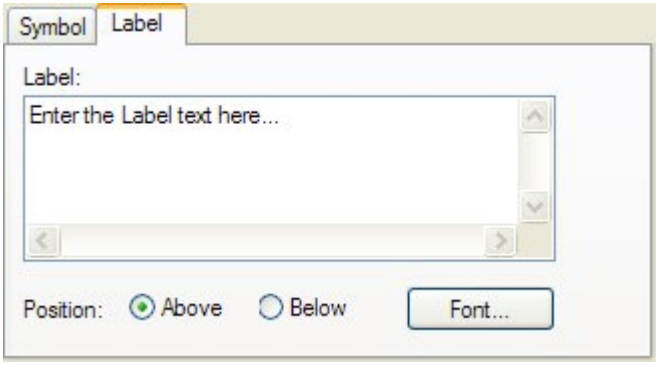
Parameter	Value
Color	This is used to choose the symbol's color. You can set the default color for all new symbols from the Line Studies page of the Default Colors and Styles dialog (page 244).
Size	This is used to choose the symbol's size. (i.e., small, medium, or large). You can set the default size for all new symbols from the Text/Symbols page of the Default Colors and Styles dialog (page 231).

Parameter	Value
Display Field	The display field shows the effect of your selections on the selected symbol.

Drawing Tip The default size of new symbols is controlled from the Default Colors and Styles dialog (page 244).

Label Tab

The Label attached to a Symbol and the Symbol itself make up one object. To edit a Symbol's label, right-click on the Symbol, select Symbol Properties from the shortcut menu, and click the Label tab.

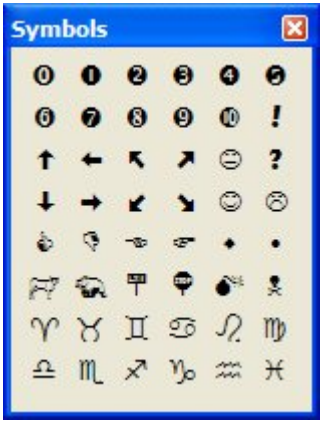


Parameter	Value
Label	Text entered here is attached to the symbol.
Position	Select whether the label appears above or below the symbol.
Font…	Click this to open a standard Windows font selection dialog; this allows you to specify the font to be used for the labels.

Reference: • For more information on fonts, see page 246.

To stamp a symbol on a chart

1. Choose **Insert>** Symbols.
2. Select a symbol from the Symbol palette.



3. Position the mouse pointer where you want the symbol to appear on the chart.
4. Click the mouse to stamp the symbol on the chart.

To remove the symbol palette from the screen

Click the Close button in the upper-right corner of the palette.

Close button

Deleting All Symbols

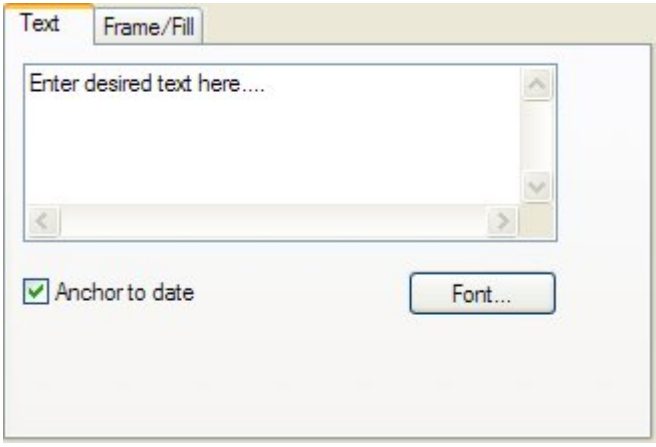
You can quickly delete all symbols (and arrows) from a chart by choosing **Edit>** Delete All.

Note: If you have enabled the Confirm Deletion of Objects option in the Application Properties dialog (page 41), you will be asked to confirm the deletion.

Text

You can edit the properties of an existing Text entry by right-clicking on it and choosing Text Properties from the shortcut menu. This dialog has two tabs: Text and Frame/Fill. For information on these tabs, see below.

Text Tab

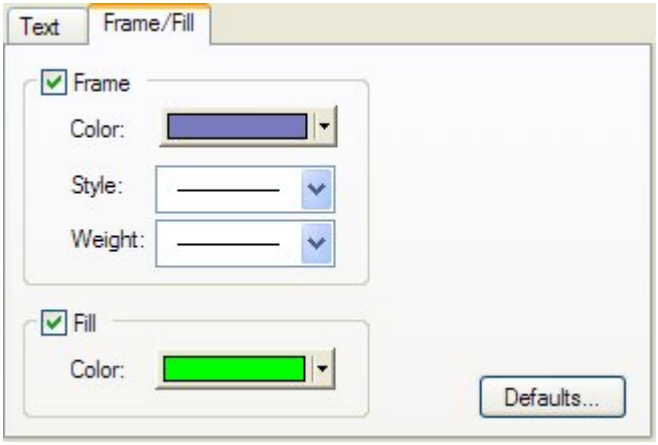


Parameter	Value
Text	Text entered here is displayed on the chart.
Anchor to date	Check this box if you want the text to stay at the specified x-axis position. If it is unchecked the text remains at the relative screen position. For example, if the text entry was positioned at the center of the chart and this box not checked, that text will remain at the center of the chart regardless of any scrolling, resizing, etc.
Font…	Click this to open a standard Windows font selection dialog; this allows you to specify the font to be used for the text.

Drawing Tip The initial default font is controlled from the Default Color and Styles dialog (page 244).

Frame/Fill Tab

This tab allows you to set the fill color of the boxed area around the text or to change the color, style, or weight of the text frame.



Parameter	Value
Frame	Check this box if you want to change any of the frame parameters.
Color	This is used to choose the frame's color.
Style	This is used to choose the frame's line style.
Weight	This is used to choose the thickness of the frame line study. **Note:** If you select a heavier weight, the Style will always appear as a solid line, although the line on the chart will have the weight you selected.
Fill	Check this box if you want to change any of the fill parameters.
Color	This is used to choose the fill's color.

References:
- For more information on fonts, see page 246.
- For general information on line studies, see page 185.

To write text on a chart

1. Choose Text from the Insert menu or text toolbar.
2. Position the mouse pointer where you want the text to appear on the chart.
3. Click the mouse to display the text box and cursor. Begin typing. You can press ENTER to write multiple lines.
4. Click the mouse outside the text box (or press CTRL+ENTER) to end the writing and anchor the text.

Working with Indicators

What is an Indicator?

An indicator is a mathematical calculation that can be applied to a security's price, volume or even to another indicator. The result is a value that is used to anticipate future changes in prices. Indicators are plotted either in a separate inner window or overlaid in the base security's inner window (e.g., a moving average). There are three types of indicators in MetaStock (explained below). The small icon displayed next to indicators in the Indicator QuickList (page 239) shows you the indicator's type. These small icons are also described below.

Price Indicators. Price indicators are always calculated using security pricing data.

Custom Indicators. Custom indicators are calculated using a formula you created with the Indicator Builder (page 281).

Plot-based Indicators. Plot-based indicators can be plotted directly on an existing plot (i.e., a price plot or another indicator plot). For example, a moving average is a plot-based indicator since it is always calculated on an existing price or indicator. If a plot-based indicator is not dropped directly on a plot (i.e., you plot it in a new inner window) it is calculated using the base security.

All indicators (price, custom, and plot) appear together in the Indicator QuickList (page 239) and the Indicators dialog (page 238).

Plotting an Indicator

There are two ways of plotting an indicator in MetaStock. You can drag and drop an indicator from the Indicator QuickList or you can choose Indicators from the Insert menu to display the Indicators dialog.

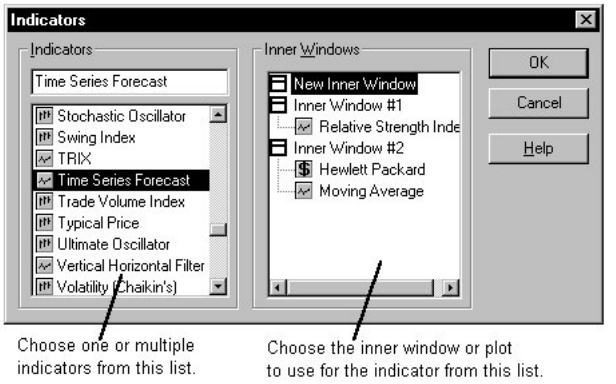
When an indicator is plotted, it is usually calculated on the chart's base security (page 163). However, some indicators (i.e., "plot-based" indicators) can be calculated on other indicators. For example, a moving average can be calculated on any plot. You could calculate a moving average using an indicator, another moving average, or a price plot.

If an indicator is calculated on a security other than the base security of the chart, the name of the security is shown in parenthesis after the

indicator's name. Indicators calculated on Kagi, Point and Figure, Renko, and Three Line Break charts use all the data in each column and then display the average value of the indicator for that column.

Using the Indicators Dialog

The Indicators dialog is accessed by choosing Indicators from the Insert menu. The Indicator dialog lets you choose the indicator(s) and the inner window in which it should be plotted.



You can select one (or multiple) indicators from the Indicators list on the left side of the dialog. Pick an inner window in which to plot the indicator(s) from the Inner Windows list on the right side of the dialog. If the selected indicator is a "plot-based" indicator, then the Inner Windows list displays the plots within each of the inner windows. This allows you to choose a specific plot on which to calculate the indicator.

The inner windows listed on the right side of the dialog are labeled Inner Window #1, Inner Window #2, etc. corresponding with the location (top to bottom) in the chart.

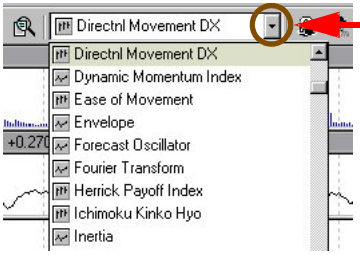
If you choose New Inner Window, the indicator is plotted in a new inner window at the top of the chart.

To plot an indicator using the Indicators dialog

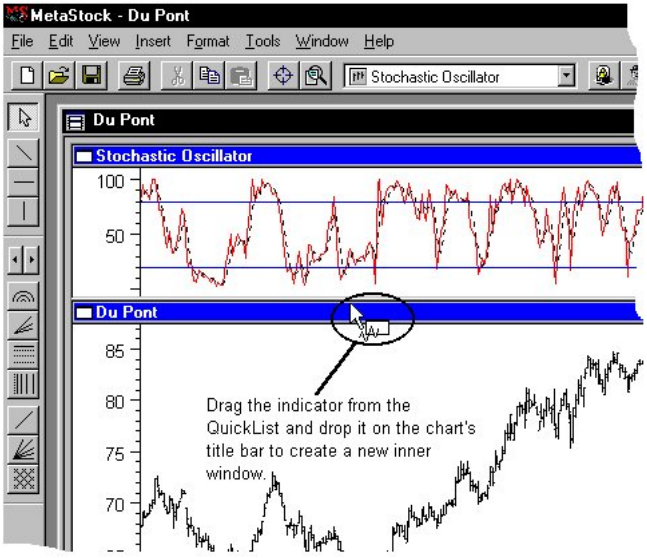
1. Select the chart in which you want to plot an indicator.
2. Choose **Insert>** Indicators.
3. Click the indicator(s) you want to plot in the Indicators list on the left side of the dialog.
4. From the Inner Windows list on the right side of the dialog, choose the inner window in which to plot the indicator.
5. Click **OK**.

Using the Indicator QuickList

The Indicator QuickList (located on the standard toolbar) provides quick access to all the indicators in MetaStock.



You can drag indicators from the list and drop them on your charts. If you drop an indicator on a chart's title bar, a new inner window is automatically created for the indicator at the top of the chart. If you drop the indicator on an inner window title bar, the indicator will plot in a new inner window above the title bar. If you drop the indicator on the x-axis, the new inner window will plot at the bottom of the chart.



You can also drop an indicator on an existing plot. Envelopes, Moving Averages, and Bollinger Bands are almost always dropped on an existing plot, since you usually want them overlaid on a plot. When you drop an indicator on an existing inner window, the Scaling Options dialog may appear prompting you to choose how you want to handle the scaling (page 177).

When dragging an indicator from the QuickList, the status bar (page 33) provides useful feedback on the location of the mouse. As a visual cue, the plot that will be used for the calculation changes to a unique color as the indicator is being dragged.

A quick way to get to the desired indicator in the QuickList is to display the QuickList and then type the first letter of the indicator's name. The list will quickly advance down the list to indicators beginning with that letter.

Indicators button

If the Standard toolbar (where the QuickList is found) is docked on either the left or right side of the screen (so it appears vertically), the Indicator QuickList changes to a button that displays the Indicators dialog when clicked.

To plot an indicator in a new inner window using the QuickList

1. Click the Indicator QuickList button on the toolbar and scroll the list until the desired indicator appears.
2. Position your mouse pointer over the small icon to the left of the desired indicator. Note how the mouse pointer changes to a hand.
3. Click *and hold* the left mouse button and drag the indicator until you have it positioned on any inner window title bar within the chart. Notice how the mouse cursor changes appearance when it's positioned over the title bar. You can even drop the indicator on the x-axis if you want it plotted at the very bottom of the chart.
4. Drop the indicator by releasing the mouse button.

To plot an indicator on an existing plot

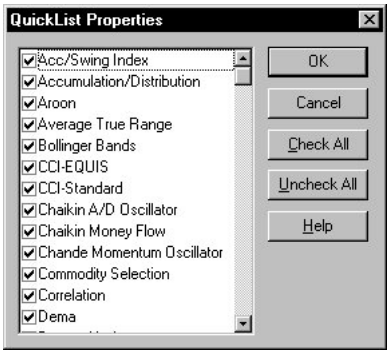
1. Click the Indicator QuickList button on the toolbar and scroll the list until the desired "plot-based" indicator appears.

   A plot-based indicator has a icon next to it.
   For more information on plot-based indicators, see page 237.
2. Position your mouse pointer over the small icon to the left of the desired indicator. Note how the mouse pointer changes to a hand.
3. Click *and hold* the left mouse button and drag the indicator until you have it positioned over the plot to calculate on. The color of the plot will change to inform you that it will be used for the indicator's calculation.
4. Drop the indicator by releasing the mouse button.

Controlling which Indicators are in the QuickList

By default, all available indicators (including custom indicators) are displayed in the QuickList. However, you may want to shorten the

list by excluding those you seldom use. This can be done with the QuickList Properties dialog.



The QuickList Properties dialog is displayed by choosing Indicator QuickList from the Format menu, or by right-clicking directly on the QuickList and choosing QuickList Properties.

Check the indicators you want displayed in the QuickList. Remove the check if you prefer not to have the indicator displayed. You can check and uncheck all indicators by using the **Check All** and **Uncheck All** buttons.

Modifying an Indicator

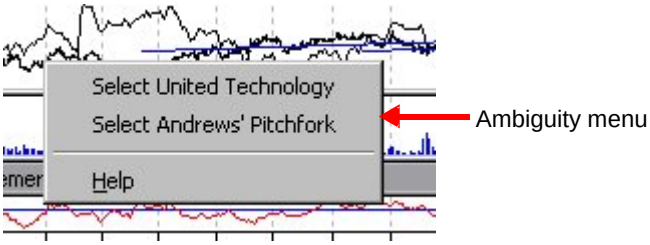
After an indicator is plotted, you can modify any of its properties (e.g., color, number of periods, etc.) with the indicator's Properties dialog. Indicators can also be copied or moved to a new inner window within the same chart or a different chart.

An indicator's Properties dialog can be accessed three ways:

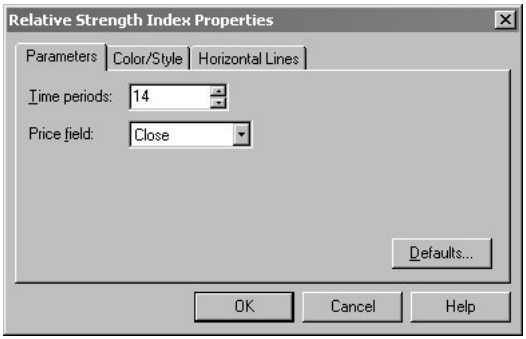
- You can right-click directly on the plotted indicator and choose Properties from the shortcut menu.
- You can double-click directly on the plotted indicator.
- You can select the indicator and choose Selected Object from the Format menu.

You can press the TAB *key to cycle through all selectable objects on your chart.*

When you are clicking on an indicator and the indicator is closely surrounded by other plots (e.g., prices, moving averages, etc.) a menu will pop up prompting you to choose the desired plot.



The following Properties dialog for a Relative Strength Index is typical of most indicator Property dialogs. Indicators that do not require parameters (Median Price, Typical Price, etc.) do not have a Parameters page in the Properties dialog.



To modify the properties of an indicator

1. Position the mouse on the plotted indicator and double-click.
2. Make the desired changes in the indicator's Properties dialog.
3. Click the **OK** button.

Properties Common to All Indicators

Every Indicator Properties dialog contains two common pages— the Color/Style page and the Horizontal Line page. You can modify the color/style and horizontal line placement of every indicator in MetaStock.

You can display an indicator's Properties dialog by right-clicking on the indicator and choosing Properties *from the shortcut menu.*

Every indicator Properties dialog also contains an **Apply** button. If you click this button, the changes made in the Properties dialog are immediately applied. The Properties dialog remains on the screen. This is helpful if you need to make quick visual adjustments to an indicator.

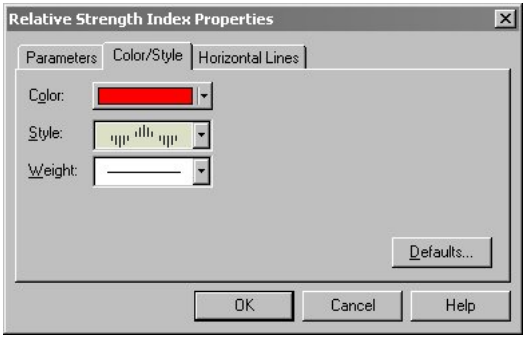
Color/Style tab

The Color/Style tab is used to modify the selected indicator only. The Color/Style tab is located in the indicator's Properties dialog.

This tab is located in the indicator's Properties dialog, which can be displayed by right-clicking on the indicator and choosing Properties from the shortcut menu.

You can also change the color and line style of the indicator by using the color and line style toolbars (page 31).

If you want to change the default color/style for all new indicators, choose **Tools>** Default Colors & Styles.
For more information on this command, see page 244.



Color. Choose the indicator color for the selected indicator from the drop-list. MetaStock can automatically rotate through different colors when plotting indicators. For more information, see page 244.

Style. Choose the line style for the selected indicator from the drop-list.

The Invisible style is useful when overlaying one indicator on another (i.e., a moving average overlaid on an RSI). When plotting a moving average on an existing indicator, there may be times that you want to hide the indicator and just show the moving average. If you delete the indicator, the moving average will also disappear since it is dependent on the indicator for the calculation. However, you can hide the indicator, by choosing the Invisible style from the Color/Style page in the indicator's Properties dialog. To redisplay a hidden indicator, use the TAB key to select it and then choose **Format>** Selected Object.

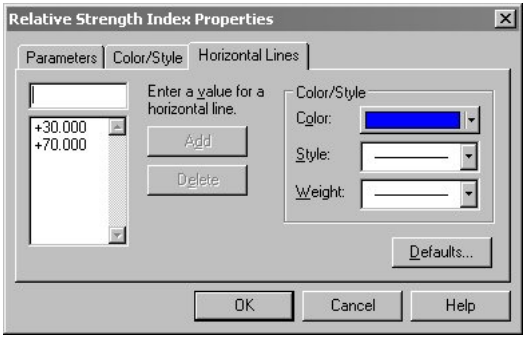
Weight. Choose the thickness of the selected indicator from the drop-list. If you select a heavier weight, the Style indicator will always appear as a solid line.

Horizontal Lines tab

Many indicators require specific values for their interpretation. For example, a Stochastic is generally considered to be at an overbought level above 80 and oversold below 20. Horizontal lines are usually placed at these levels to help in the interpretation.

The Horizontal Lines tab allows you to control the placement of these lines for each indicator. Every time the indicator is plotted, the specified horizontal lines are automatically drawn.

This tab is located in the indicator's Properties dialog, which can be displayed by right-clicking on the indicator and choosing Properties from the shortcut menu. The following image shows an example of the Horizontal Lines tab:



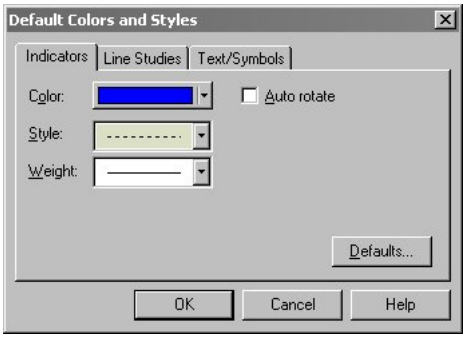
You can also control the color, line style, and weight of the horizontal lines. The color, style, and weight you choose is used for all horizontal lines drawn with the indicator.

Default Colors and Styles Dialog

The **Tools>** Default Colors and Style command lets you change the default colors and styles used for new plots (i.e., indicators, line studies, and text or symbols).

Note: Default colors and styles only affect new item. They do *not* affect existing charts.

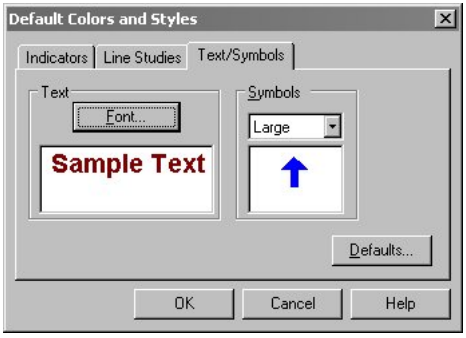
For example, if you always want new indicators plotted as dotted blue instead of solid red, you could use the Default Colors and Styles dialog to make this change.



The Indicators and Line Studies pages contain the usual color, style, and weight drop-lists for modifying indicators and line studies.

Note: If you select a heavier weight, the Style indicator will always appear as a solid line, regardless of the line style.

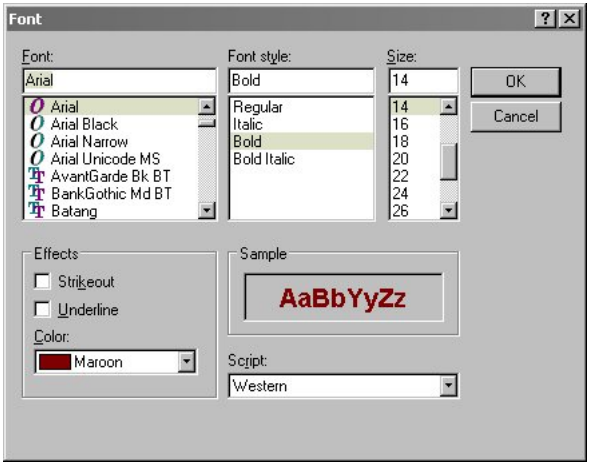
When the Auto Rotate checkbox on the Indicators page is checked, MetaStock automatically chooses different colors for indicators plotted successively in the same inner window. This is particularly useful if you frequently plot multiple indicators (e.g., moving averages) in the same inner window. The background color of the indicator's inner window is automatically skipped. You can also change the font used for text (page 234) and the size of symbols (page 231) with the Text/Symbols page.



Changing Fonts

Click the **Font** button on the Text/Symbols page of the Default Colors and Styles dialog to change the fonts for text and symbols that appears on charts. You can change the font for text, the x- and y-axis, symbol labels, and headers/footers on charts using the standard Windows Font dialog.

Note: This font does *not* change the fonts associated with the x- and y-axis, or those associated with the headers/footers.



Font. Choose the font. The number and type of fonts appearing in this list depends on your printer selection.

Font Style. Choose the style for the font.

Font Size. Choose the point size for the font.

Effects. Check the box for the desired effects.

Color. Choose the desired color for the font.

Sample. This box shows how your selected font will appear.

Script. Choose the desired script style for the font.

Copying, Deleting, and Moving Indicators

Just as price plots and line studies can be moved using drag and drop techniques, so can indicators. Perhaps you want to see three of your favorite indicators overlaid on each other in the same inner window, or maybe you want to copy an RSI of the Dow into your IBM chart. Alternatively, you decide that you want to delete the moving average plotted on your Corn chart.

Sometimes when you are trying to click on an indicator that is crowded among other plots, a pop-up "ambiguity" menu appears from which you can select the desired plot.
For more information on this menu, see page 167.

Tip: You can select multiple indicators for copying, moving, or deleting by holding down the SHIFT key as you click your mouse.

Copying and Moving Indicators

Move cursor

Copying and moving an indicator plot involves basic drag and drop techniques. The only difference between copying and moving is that you hold the CTRL key down when copying. When the mouse pointer is positioned over an indicator, the mouse pointer displays a forested arrow (i.e., the move cursor) indicating that the indicator can be moved or copied.

When an indicator (or any object, for that matter) is being copied, a small plus sign appears next to the mouse pointer while dragging.

When you drag an indicator and drop it into an existing inner window, the Scaling Options dialog may appear prompting you to decide how to handle the scaling (page 177).

Tip: You can copy (or move) an indicator to a *new* inner window by dragging and dropping the indicator on a chart title bar or inner window title bar.

To move (or copy) an indicator to an existing inner window

1. Position the mouse over the indicator you want to move or copy.
2. If copying, hold the CTRL key down. Click *and hold* the left mouse button and drag the indicator to another inner window. The inner window can be in the same chart or a different chart.
3. Release the mouse button.
4. Choose the desired option from the Scaling Options dialog (page 177) and click **OK**.

To move (or copy) an indicator to a new inner window

1. Position the mouse over the indicator you want to move or copy.
2. If copying, hold the CTRL key down. Click *and hold* the left mouse button and drag the indicator so that it is positioned over the desired chart title bar, or inner window title bar. The chart can be the same chart or a different chart.
3. Release the mouse button.

Deleting Indicators

You can delete an indicator by right-clicking on the indicator plot and choosing Delete from the shortcut menu. You can also delete an indicator by selecting the indicator and pressing the DEL key.
An option in the Application Properties dialog (page 41) controls whether or not you are asked to confirm the deletion of the object.

To delete an indicator

1. Position the mouse on the desired indicator plot.
2. Click the right mouse button.
3. Choose Delete from the shortcut menu or press the DEL key.

Viewing Indicator Values with the Data Window

Data Window button

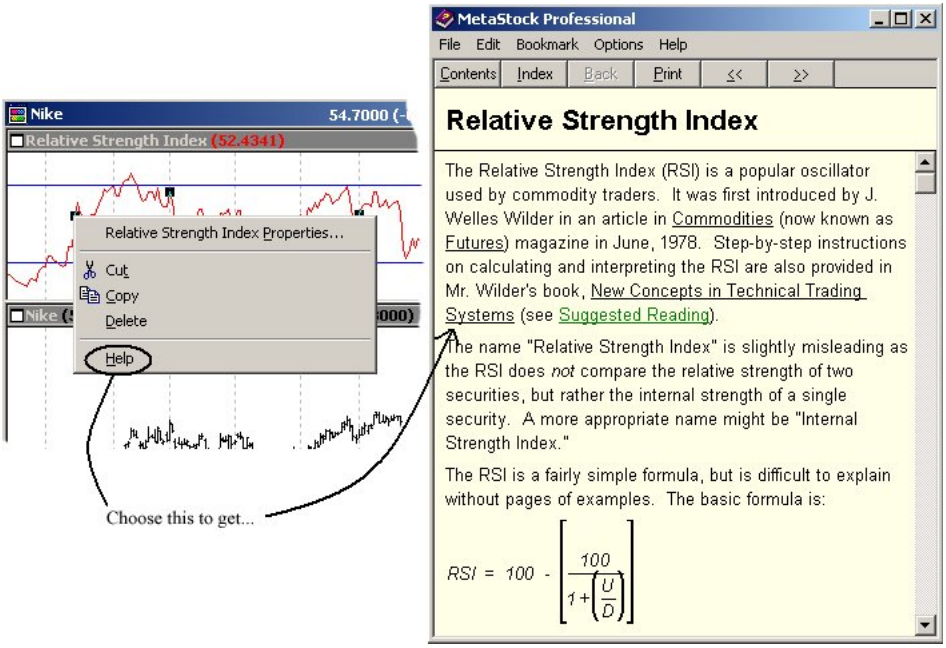
To see the numerical values of a chart at the mouse pointer's location, use the Data Window. The Data Window is displayed by choosing Data Window from the View menu. You can also display the Data Window by clicking the Data Window button on the toolbar. The Data Window continually updates to reflect the numerical values at the mouse pointer's location.

The name of the security being displayed is shown in the title bar of the Data Window. If the Data Window is docked the name appears inside the Data Window itself. Therefore, if you have multiple charts displayed on your screen, you can simply move the mouse from chart to chart and the Data Window will display the appropriate data.

For more information on using the Data Window, see page 182.

Online Indicator Interpretation

If you need help interpreting an indicator, MetaStock's help system contains information on every indicator. Right-click on the plotted indicator and choose Help from the shortcut menu to get a help screen explaining the indicator and how to interpret it.



For more information on interpreting indicators, see page 303.

Indicator Parameters

The parameters for every indicator are listed on the following pages. The parameter pages for color/style and horizontal lines are identical for every indicator. For information on the Color/Style and the Horizontal Lines pages within the indicator's Properties dialog, see page 242.

The parameters for an indicator are specified at the time the indicator is plotted. You can edit the parameters of a plotted indicator by double-clicking on the indicator (page 241).

Accumulation Swing Index

The parameters for the Accumulation Swing index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Note: Accumulation Swing Indexes require open prices to calculate.

Limit Move. The following example table lists the limit moves for several commodities traded on the Chicago Board of Trade:

Commodity	Limit Move
Corn	$0.10
Heating Oil	$0.04
Soybeans	$0.30
T-bonds	$3.00

You may need to adjust the limit moves shown in the above table based on the position of the decimal in your data files. For example, if the price of corn is quoted as $2.45, the limit move would be $0.10. However, if the price of corn is quoted as $245.00, the limit move would be $110.

Tip: If the security does not have a limit move (e.g., a stock or some futures), we suggest you enter the maximum value allowed (i.e., $30,000).

References:
- Color/Style and Horizontal Lines information, see page 242.
- Accumulation Swing Index interpretation, see page 307.

Accumulation/Distribution

There are no parameters for the Accumulation/Distribution indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Accumulation/Distribution interpretation, see page 306.

Aroon

The parameters for the Aroon indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Aroon. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Aroon interpretation, see page 308.

Average True Range

The parameters for the Average True Range are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Average True Range. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Average True Range interpretation, see page 309.

Bollinger Bands

The parameters for the Bollinger Bands are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Deviations. Enter the number of standard deviations by which to Shift the upper and lower bands.

Horizontal Shift. Enter the number of periods to shift the Bollinger Bands. For example, enter "*5*" to shift them five periods to the right; enter "*-5*" to shift them five periods to the left.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating Bollinger Bands.

If you edit the parameters of the middle band, all three bands are affected. If you edit the parameters of the upper or lower bands individually, only that band is affected. Therefore, if you want symmetrical bands, edit the parameters of the middle band only.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Bollinger Bands interpretation, see page 310.

Chaikin A/D Oscillator

There are no parameters for the Chaikin A/D Oscillator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Chaikin Oscillator interpretation, see page 312.

Chaikin Money Flow

The parameters for the Chaikin Money Flow indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Chaikin Money Flow interpretation, see page 315.

Chande Momentum Oscillator

The parameters for the Chande Momentum Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Chande Momentum Oscillator interpretation, see page 316.

Commodity Channel Index (CCI)

The parameters for the CCI are shown below. These parameters are specified at the time the indicator is plotted. You can edit the

parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Commodity Channel Index. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Commodity Channel Index interpretation, see page 317.

Commodity Selection Index

The parameters for the Commodity Selection Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Commodity Selection Index. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Value a $.01 Move. In Wilder’s book (*New Concepts in Technical Trading Systems*, page 765), he uses $50 for Soybeans, $400 for Pork Bellies, and $375 for Coffee.

Margin Requirement. Enter the margin requirement for the contract in dollars.

Commission Amount. Enter the commission cost in dollars.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Commodity Selection Index interpretation, see page 318.

Correlation

Before attempting to plot the Correlation indicator, you must first select two plots. This could be two price plots, an indicator and a price plot, or two indicators. The first plot selected will be the independent variable and the second, the dependent variable.

The parameters for the Correlation indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. This parameter specifies the number of time periods that are used to “smooth” the dependent and independent variables when determining their correlation.

Forward Shift. This parameter specifies the number of time periods to Shift the independent variable's data forward. This can be used to determine whether a change in an indicator (the independent variable) "leads" a change in prices (the dependent variable). For example, if you find that an indicator has a high positive correlation to the security's price when Shifted forward three periods, you may assume that a change in the indicator today will predict a change in the security's price three periods from now.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Correlation Analysis interpretation, see page 319.

To plot the Correlation indicator

1. Select the two plots that you want to correlate (i.e., two indicators, a price plot and an indicator, or two price plots).
   Select the first plot (the independent variable) by simply clicking on it.
   Select the second plot (the dependent variable) by holding down the Shift key and clicking on it. Small square handles will appear on the plots indicating that they are selected.
2. Drag the Correlation indicator from the Indicator QuickList and drop it on the chart.

DEMA

The parameters for the DEMA indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating DEMA.

References:
- Color/Style and Horizontal Lines information, see page 242.
- DEMA indicator interpretation, see page 321.

Demand Index

There are no parameters for the Demand Index.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Demand Index interpretation, see page 319.
- Demand Index function syntax, see page 443.

Detrended Price Oscillator

The parameters for the Detrended Price Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Detrended Price Oscillator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Detrended Price Oscillator interpretation, see page 324.

Directional Movement

There are five indicators comprising the Directional Movement system: +DI, -DI, ADX, ADXR, and DX.

The parameters for the Directional Movement indicators are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Directional Movement. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Directional Movement indicator interpretation, see page 324.

Dynamic Momentum Index

The parameters for the Dynamic Momentum Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Dynamic Momentum Index.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Dynamic Momentum Index interpretation, see page 326.

Ease of Movement

The parameters for the Ease of Movement are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Ease of Movement. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

References:
- Color/Style and Horizontal Lines information, see page 242.
- Ease of Movement interpretation, see page 327.

Envelope

The parameters for Envelopes are shown below. These are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the envelopes. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Vertical Shift %. Enter the percentage to shift the upper and lower envelopes from the base moving average. For example, enter "*10*" to shift the envelopes 10 percent above and below the base moving average.

Horizontal Shift. Enter the number of periods to shift the envelopes. For example, enter "*5*" to shift the envelopes five periods to the right; enter "*-5*" to shift the envelopes five periods to the left; etc.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the envelopes.

When you initially plot envelopes, the above options affect the upper and lower envelopes equally. However, after the envelopes are plotted, you can edit the parameters of each band separately.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Envelopes interpretation, see page 327.

Forecast Oscillator

The parameters for the Forecast Oscillator are shown below. These are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. The number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. The price field (i.e., open, high, low, or close) to use when calculating the indicator.

Signal Moving Average Time Periods. The number of time periods to use when calculating the Forecast Oscillator's signal line. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Style. Choose the line style for the signal line.

Color. Choose the color for the signal line.

Note: Both the color and style for the Forecast Oscillator line are changed from the Color/Style page in the MACD Properties dialog.

References:

- Color/Style and Horizontal Lines information, see page 242.
- Forecast Oscillator interpretation, see page 331.

Fourier Transform

The parameters for the Fourier Transform are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Interpreted. Choose this option if you want MetaStock to interpret the Fourier data and display the information in an easily understood format.

Raw. Choose this option if you want MetaStock to display the raw (i.e., more detailed and complex) Fourier data. If you select Raw, you will be prompted for the following additional parameters:

Time Periods	Enter the number of time periods to analyze.
Sample Length	The Fourier Transform can group a number of data values together and analyze them as a "set of sets." For example, selecting 5 will group the data into sets of 5 periods. The maximum value for the sample length is 1/4 the number of time periods loaded, but the maximum useful sample length is around 5.

Price Field Choose the price field (i.e. open, high, low, or close) to use when calculating the Fourier Transform.

Method Choose the type of analysis, either Amplitude (strength) or Spectrum.

Smoothing Choose the smoothing method to remove trends from the data (normalization method). Choices are Detrend (linear regression) and Mean (averaging).

References:
- Color/Style and Horizontal Lines information, see page 242.
- Fourier Transform interpretation, see page 332.

Herrick Payoff Index

The parameters for the Herrick Payoff Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Note: The Herrick Payoff Index requires open interest to calculate.

One Cent Move. According to Herrick, the recommended input for "the value of a one cent move" is "100" for most commodities. The only exception is for Silver, which should be "50."

Multiplying Factor. The multiplying factor is part of a complex smoothing mechanism. However, the results are similar to the smoothing obtained by a moving average. For example, a multiplying factor of ten produces results similar to a 10-period moving average.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Herrick Payoff Index interpretation, see page 335.

Inertia

The parameters for the Inertia indicator are shown below. These are specified at the time the indicator is plotted. Edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. The number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

RVI Periods. Enter the number of periods to use for the Relative Volatility Index (RVI) which the Inertia indicator is based on.

Price Field. Choose the price field (i.e. open, high, low, or close) to use when calculating the indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Inertia indicator interpretation, see page 338.

Intraday Momentum Index

The parameters for the Intraday Momentum Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu. Note that the Intraday Momentum Index requires open prices to calculate.

Time Periods. Enter the number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Intraday Momentum Index interpretation, see page 338.

Klinger Oscillator

The parameters for the Klinger Oscillator are shown below. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the oscillator's signal line. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Style. Choose the line style for the signal line.

Color. Choose the color for the signal line.

Note: Both the color and style for the Oscillator line are changed from the Color/Style page in the Klinger Oscillator dialog.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Klinger Oscillator interpretation, see page 340.

Linear Regression Indicator

The parameters for the Linear Regression indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Linear Regression indicator interpretation, see page 342.

Linear Regression Slope

The parameters for the Linear Regression Slope are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Linear Regression Slope interpretation, see page 343.

MACD

The parameters for the MACD are shown below. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

In order to maintain the mathematical integrity of the MACD as prescribed by Gerald Appel, MetaStock does not allow the time periods in the MACD to be changed. The MACD is actually the difference between 0.075 and 0.15 exponential moving averages. No exact time periods (using whole numbers) correspond with these percentages.

If you want to plot an MACD-like indicator using moving averages other than the ones recommended by Gerald Appel, use the Price Oscillator (page 292).

Signal Time Periods. Enter the number of time periods to use when calculating the MACD's signal line. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Style. Choose the line style for the signal line.

Color. Choose the color for the signal line.

Note: Both the color and style for the MACD line are changed from the Color/Style page in the MACD Properties dialog.

References:
- Color/Style and Horizontal Lines information, see page 242.
- MACD interpretation, see page 345.

Market Facilitation Index

There are no parameters for the Market Facilitation Index.

References:
- Color/Style and Horizontal Lines information, see page 242.

- Market Facilitation Index interpretation, see page 346.

Mass Index

The parameters for the Mass Index are shown below.
These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Mass Index. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Mass Index interpretation, see page 348.

Median Price

There are no parameters for the Median Price.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Median Price indicator interpretation, see page 348.

MESA Sine Wave

The parameters for the MESA Sine Wave indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the MESA Sine Wave indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Mesa Lead Sine. Choose the style and color for the lead sine plot.

References:
- Color/Style and Horizontal Lines information, see page 242.
- MESA Sine Wave interpretation, see page 349.

Momentum

The parameters for the Momentum indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Momentum. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating Momentum.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Momentum indicator interpretation, see page 350.

Money Flow Index

The parameters for the Money Flow Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Money Flow Index. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Money Flow Index interpretation, see page 350.

Moving Average

The parameters for a moving average are shown below. These parameters are specified at the time the moving average is plotted. You can edit the parameters of an existing moving average by right-clicking on the moving average and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the moving average. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Vertical Shift %. Enter the percentage to shift the moving average up or down. For example, enter "*10*" to shift the moving average upward by 10 percent; enter "*-5*" to shift the moving average downward by 5 percent.

Horizontal Shift. Enter the number of periods to Shift the moving average. For example, enter "*5*" to Shift the moving average five periods to the right; enter "*-5*" to Shift the moving average five periods to the left; etc.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, and volume adjusted.

Price Field. Choose the price field (i.e., open, high, low, close, median price, or typical price) to use when calculating the moving average. The median price (page 261) is defined as

"(high + low) / 2" and the typical price (page 276) is defined as "(high + low + close) / 3."

Note: When plotting a moving average on an existing indicator, there may be times that you want to hide the indicator and just show the moving average. If you delete the indicator, the moving average will also disappear, as it is dependent on the indicator for the calculation. However, you can hide the indicator, by choosing the Invisible Style from the indicator's Properties dialog.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Moving Average interpretation, see page 351.

Negative Volume Index

The parameters for the Negative Volume Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the moving average.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Negative Volume Index interpretation, see page 358.

On Balance Volume

The parameters for the On Balance Volume are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the moving average.

References:
- Color/Style and Horizontal Lines information, see page 242.
- On Balance Volume interpretation, see page 361.

Open Interest

There are no parameters for Open Interest.

Note: Your security files *must* contain open interest in order to plot open interest.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Open Interest interpretation, see page 363.

Option Expiration

There are no parameters for the Option Expiration indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Option Expiration interpretation, see page 363.

Option Delta, Gamma, Price, Theta, Vega

The parameters for the Option indicators are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Put or **Call**. Choose the type of option.

Equity or **Future**. Choose the underlying security type. The Black-Scholes model must be adjusted for options on futures, because no initial investment (other than a margin deposit) is required to open a future position. You should choose Equity if you are analyzing an index option.

Expiration Date. Enter the date the option contract expires. In the USA, this is usually the third Friday of the expiration month.

Strike Price. Enter the option's strike price.

Interest Rate. Enter the short-term "risk free" interest rate (e.g., 13-week T-bills). The interest rate should be entered as a percentage (e.g., 4.75).

Annual Dividend. Enter the total of the most recent four quarters of dividend payments per share (e.g., 3.00). If no dividends were paid, enter *0*.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Option indicators interpretation, see page 363.
- delta(), gamma(), price(), theta(), and vega () functions in the MetaStock Formula Language, see page 436.

Option Life

The parameters for the Option Life are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Expiration Date. Enter the date the option contract expires. In the USA this is usually the third Friday of the expiration month.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Option Life interpretation, see page 363.
- life() function in the MetaStock Formula Language, see page 460.

Option Volatility

There are no parameters for Option Volatility.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Option Volatility interpretation, see page 363.

Parabolic SAR

The parameters for the Parabolic SAR are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Step. As a trade makes new highs/lows, the Parabolic SAR will rise/fall according to the SAR step size. For example, if the trade makes new highs for three consecutive days, then the SAR step increases by 0.02 each day (i.e., 0.02 to 0.04 to 0.06, etc.). The author (Welles Wilder) recommends a step size of 0.02 for most securities.

Maximum. Enter the maximum value the SAR Step can obtain. The author recommends an SAR Maximum of 0.20 for most securities.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Parabolic SAR interpretation, see page 366.
- Wilder's book on the Parabolic SAR (*New Concepts in Technical Trading Systems*), see page 765.

Performance

The parameters for the Performance indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Performance indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Performance indicator interpretation, see page 366.

Polarized Fractal Efficiency

The parameters for the Polarized Fractal Efficiency indicator (PFE) are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Smoothing Periods. Enter the number of periods to use when smoothing the PFE.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the PFE.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Polarized Fractal Efficiency interpretation, see page 368.

Positive Volume Index

The parameters for the Positive Volume Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Positive Volume Index.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Positive Volume Index interpretation, see page 369.

Price Channel

The parameters for the Price Channel are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Price Channel interpretation, see page 370.

Price Oscillator

The parameters for the Price Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Short-term. Enter the number of time periods in the short-term moving average.

Long-term. Enter the number of time periods in the long-term moving average.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, or variable).

Percent or **Points**. Choose the method to use when displaying the relationship between the two moving averages. Choose *Percent* to see the ratio (in percent) between the short- and long-term moving averages. Choose *Points* to see the point difference.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Price Oscillator interpretation, see page 371.

Price Rate-Of-Change

The parameters for the Price Rate-Of-Change are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating Price Rate-Of-Change. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Percent or **Points**. Choose the method to use when displaying the change in the prices. Choose *Percent* to see the ratio (in percent) between the prices. Choose *Points* to see the point difference.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Price Rate-Of-Change interpretation, see page 371.

Price Volume Trend

The parameters for the Price Volume Trend are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low or close) to use when calculating the Price Volume Trend.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Price Volume Trend interpretation, see page 373.

Projection Bands

The parameters for the Projection Bands are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Projection Bands interpretation, see page 374.

Projection Oscillator

The parameters for the Projection Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Slowing Periods. Enter the number of time periods used in the moving average trigger line.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Projection Oscillator interpretation, see page 375.

Qstick

The parameters for the Qstick indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Note: The Qstick indicator requires open prices to calculate.

Time Periods. Enter the number of time periods to use when calculating the indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Method. Choose the method used to calculate the moving average of the difference between opening and closing prices.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Qstick indicator interpretation, see page 376.

r-squared

The parameters for the r-squared indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- r-squared indicator interpretation, see page 377.

Random Walk Index

The parameters for the Random Walk Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

The Random Walk Index automatically determines the optimum time periods to use in the calculation. You can control the range of time periods analyzed by setting the minimum and maximum values. The author of the indicator recommends values of 8 and 64 (the defaults) for long-term analysis, and 2 and 7 for short-term.

Minimum Time Periods. Enter the minimum number of time periods to consider when calculating the indicator. “Time periods” indicate 5 minutes if the chart contains 5-minute data, days if the chart contains daily data, weeks if the chart contains weekly data, etc.

Maximum Time Periods. Enter the number of maximum number of time periods to consider when calculating the indicator. “Time periods” indicate 5 minutes if the chart contains 5-minute data, days if the chart contains daily data, weeks if the chart contains weekly data, etc.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Random Walk Index interpretation, see page 379.

Range Indicator

The parameters for the Range Indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Smoothing Periods. Enter the number of periods to use when smoothing the Range Indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.

- Range Indicator interpretation, see page 380.

Relative Momentum Index

The parameters for the Relative Momentum Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Momentum. Enter the number of periods to use when calculating the momentum component of the Range Indicator.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Relative Momentum Index interpretation, see page 381.

Relative Strength Comparative

The parameters for the Relative Strength Comparative indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Security and Folder. Click the Browse button to select the security with which to compare the chart's base security. This is usually a market index like the S&P 500. The chart's base security is divided by the selected security.

Normalize To Start At Zero. Check this box if you want the indicator to be "normalized" to start at zero. This is done by subtracting the beginning Relative Strength ratio (for the first bar loaded in the chart) from every subsequent value. This is helpful for comparing one security's Relative Strength with another's.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Relative Strength Comparative interpretation, see page 382.
- "Base security" concept, see page 163.

Relative Strength Index

The parameters for the Relative Strength Index (RSI) indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Relative Strength Index. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Relative Strength Index.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Relative Strength Index interpretation, see page 384.

Relative Volatility Index

The parameters for the Relative Volatility Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Relative Volatility Index interpretation, see page 385.

Spread

The parameters for the Spread indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Security and Folder. Click the **Browse** button to select the security with which to spread against the chart's base security. The selected security is subtracted from the chart's base security.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Spread indicator interpretation, see page 388.
- "Base security" concept, see page 163.

Standard Deviation

The parameters for the Standard Deviation indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Standard Deviation. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Deviations. Enter the number of standard deviations by which to Shift the plot upward.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Standard Deviation.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Standard Deviation interpretation, see page 388.

Standard Error

The parameters for the Standard Error indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Standard Error interpretation, see page 390.

Standard Error Bands

The parameters for the Standard Error Bands are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Standard Error. Enter the number of standard errors by which to shift the upper and lower bands.

Horizontal Shift. Enter the number of periods to shift the Standard Error Bands. For example, enter "*5*" to shift them five periods to the right; enter "*-5*" to shift them five periods to the left; etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

Smoothing Periods. Enter the number of periods to use for the smoothing (i.e., the moving average calculation).

Smoothing Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

References:
- Color/Style and Horizontal Lines information, see page 242.
- Standard Error Bands interpretation, see page 392.

Stochastic Momentum Index

The parameters for the Stochastic Momentum Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

%K Time Periods. Enter the number of time periods used in the %K calculation.

%K Smoothing Periods. Enter the number of time periods used in the internal smoothing of the %K value.

Double Smooth Periods. Enter the number of time periods used in the double smoothing component of the %K value.

%D Time Periods. Enter the number of time periods used in the moving average signal line of %K. This is plotted as a dotted line (default) on top of %K.

Method. Choose the method (i.e., exponential, simple, weighted, time series, triangular, or variable) used to calculate %D.

Style. Choose the line style (i.e., solid, dashed, etc.) used for the %D.

Color. Choose the color used for the %D.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Stochastic Momentum Index interpretation, see page 392.

Stochastic Oscillator

The parameters for the Stochastic Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

%K Time Periods. Enter the number of time periods used in the stochastic calculation.

%K Slowing. Enter the number of time periods used in the internal smoothing of the %K value. A value of 1 is considered a fast stochastic; the default value of 3 is considered a slow stochastic.

%D Time Periods. Enter the number of time periods used in the moving average of %K. This is plotted as a dotted line (default) on top of %K.

%D Method. Choose the method (i.e., exponential, simple, weighted, time series, triangular, or variable) used to calculate %D.

%D Style. Choose the line style (i.e., solid, dashed, etc.) used for the %D.

%D Color. Choose the color used for the %D.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Stochastic Oscillator interpretation, see page 393.

Swing Index

The parameters for the Swing Index are shown below.
These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu. Note that the Qstick requires open prices to calculate.

Limit Move. The table below lists the limit moves for several commodities traded on the Chicago Board of Trade:

Commodity	Limit Move
Corn	$0.10
Heating Oil	$0.04
Soybeans	$0.30
T-bonds	$3.00

You may need to adjust the limit moves shown in the above table based on the position of the decimal in your data files. For example, if the price of corn is quoted as $3.45, the limit move would be $0.10. However, if the price of corn is quoted as $345.00, the limit move would be $110. If the security does not have a limit move (e.g., a stock or some futures), we suggest you enter the maximum value allowed (i.e., $30,000).

References:
- Color/Style and Horizontal Lines information, see page 242.
- Swing Index interpretation, see page 397.

TEMA

The parameters for the TEMA indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the TEMA indicator. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the indicator.

References:
- Color/Style and Horizontal Lines information, see page 242.
- TEMA indicator interpretation, see page 397.

Time Series Forecast

The parameters for the Time Series Forecast are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Time Series Forecast. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Time Series Forecast.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Time Series Forecast interpretation, see page 400.

Trade Volume Index

The parameters for the Trade Volume Index are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Minimum Tick. This controls when volume switches from the buy side to the sell side. If the absolute value of the uptick or downtick is less than the Minimum Tick Value, MetaStock will continue to assign the volume to the current side (i.e., buy or sell side). If the absolute value of the price change is greater than the Minimum Tick Value and the price changes direction, MetaStock will switch and begin assigning volume to the opposite side.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Trade Volume Index.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Trade Volume Index interpretation, see page 401.

TRIX

The parameters for the TRIX are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating TRIX. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating TRIX.

References:
- Color/Style and Horizontal Lines information, see page 242.
- For interpretation information on the TRIX indicator, see page 405.

Typical Price

There are no parameters for Typical Price.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Typical Price interpretation, see page 405.

Ultimate Oscillator

The parameters for the Ultimate Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

First Cycle. Enter the number of time periods in the short-term cycle.

Second Cycle. Enter the number of time periods in the intermediate-term cycle.

Third Cycle. Enter the number of time periods in the long-term cycle.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Ultimate Oscillator interpretation, see page 406.

Vertical Horizontal Filter (VHF)

The parameters for the VHF are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Vertical Horizontal Filter. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Vertical Horizontal Filter.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Vertical Horizontal Filter interpretation, see page 406.

Volatility (Chaikin's)

The parameters for the Chaikin’s Volatility indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Moving Average. Enter the number of time periods to use when smoothing the differences between the high and low prices. The author (Marc Chaikin) recommends a value of 10.

Rate-of-Change. Enter the number of time periods to use when calculating the percent rate-of-change of the moving average. The author (Marc Chaikin) recommends a value of 10.

References:
- Color/Style and Horizontal Lines information, see page 172.
- Chaikin’s Volatility interpretation, see page 407.

Volume

The parameters for the Volume indicator are shown below. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Note: Your security files must *contain* volume in order to plot volume.

Zero-Based. Check this box if you want the volume bars to be scaled with a base of zero. If the box is unchecked, the volume is scaled using the lowest volume bar as a base.

Some real-time data vendors do not provide volume with every tick. If this is the case, MetaStock will automatically assign a volume value of “1” for every incoming tick. This allows you to see the number of “ticks” that have come in during a specified period. For example, if the volume on a 1-minute bar is 22, 22 trades came in during that minute.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Volume interpretation, see page 408.

Volume Oscillator

The parameters for the Volume Oscillator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Short-term. Enter the number of time periods in the short-term moving average.

Long-term. Enter the number of time periods in the long-term moving average.

Method. Choose the moving average calculation method (i.e., simple, exponential, weighted, time series, triangular, variable, or volume adjusted).

Percent or **Points**. Choose the method to use when displaying the relationship between the two moving averages. Choose *Percent* to see the ratio (in percent) between the short- and long-term moving averages. Choose *Points* to see the point difference.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Volume Oscillator interpretation, see page 409.
- Volume Oscillator function, see page 409

Volume Rate-Of-Change

The parameters for the Volume Rate-Of-Change are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Volume Rate-Of-Change. “Time periods” indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Percent or Points. Choose the method to use when displaying the change in the volume. Choose *Percent* to see the ratio (in percent) between the volume figures. Choose *Points* to see the point difference.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Volume Rate-Of-Change interpretation, see page 410.

Weighted Close

There are no parameters for Weighted Close.

References:
- Color/Style and Horizontal Lines information, see page 242.
- Weighted Close interpretation, see page 410.

Wilder's Smoothing

The parameters for the Wilder's Smoothing indicator are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Wilder's Smoothing indicator. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Wilder's Smoothing indicator.

References:

- Color/Style and Horizontal Lines information, see page 242.
- Wilder's Smoothing interpretation, see page 411.
- For Wilder's book (*New Concepts in Technical Trading Systems*) on this indicator, see page 765.

Williams' %R

The parameters for the Williams' %R are shown below.
These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Time Periods. Enter the number of time periods to use when calculating the Williams' %R. "Time periods" indicate days if the chart contains daily data, weeks for weekly data, hours for hourly data, etc.

References:

- Color/Style and Horizontal Lines information, see page 242.
- Williams' %R interpretation, see page 411.

Williams' Accumulation/Distribution

There are no parameters for Williams' Accumulation/Distribution.

References:

- Color/Style and Horizontal Lines information, see page 242.
- Williams' Accumulation/Distribution interpretation, see page 412.

Zig Zag

The parameters for the Zig Zag are shown below. These parameters are specified at the time the indicator is plotted. You can edit the parameters of an existing plot by right-clicking on the indicator and choosing Properties from the shortcut menu.

Price Field. Choose the price field (i.e., open, high, low, or close) to use when calculating the Zig Zag.

Reversal Amount. Enter the amount that will cause a reversal. For example, if you enter "*5*," a five percent move is required to cause a bend (i.e., zig or zag) in the Zig Zag indicator.

Percent or **Points**. Choose the calculation method to use for the reversal amount. Choose *Percent* if you want the Reversal Amount calculated in percent. Choose *Points* if you want the Reversal Amount calculated in points.

References:

- Color/Style and Horizontal Lines information, see page 242.
- Zig Zag indicator interpretation, see page 413.
- Zig Zag function, see page 476.

Creating Your Own Indicators

What is the Indicator Builder?

With all the built-in indicators that MetaStock offers, you may be wondering why you'd ever need to create your own indicators. Well, technical analysis is constantly evolving. The hot new indicator of today is soon overshadowed by another. For this reason, MetaStock provides a powerful tool called the Indicator Builder that lets you create indicators.

Maybe you've read about a new indicator in a trade magazine or a new book. Chances are, you'll be able to create the indicator with the Indicator Builder.

The Indicator Builder is considered a "power tool," that is, it is not considered a mainstream, basic feature of the program.
To effectively use the Indicator Builder, you'll need to understand basic mathematical concepts and logical expressions.

IMPORTANT: Due to the inherent complexity in the design and creation of custom indicators, trading systems, explorations, and experts, Equis cannot provide support over the phone for this process. However, support is available through email. The `Formula Help.doc` file, found in the MetaStock folder, is a sample request form you can use when requesting this service. Complete the form in detail and email it to *formulas@equis.com* or submit a request via the Equis web site under Customer Zone | Trading Resources | Custom Formulas. This service is usually free, but we reserve the right to charge a fee for extensive development.

Custom indicator icon

Indicators created with the Indicator Builder are plotted exactly like built-in indicators. They can be dragged from the Indicator QuickList or plotted from the Indicators dialog.

If you are familiar with writing formulas in spreadsheet programs (i.e., Microsoft Excel, Lotus 1-2-3, etc.), this probably looks familiar to you. You may be able to start writing your own indicators immediately. If this looks foreign to you, don't worry— the Indicator Builder Tutorial (see page 282) will help you get up to speed.

The Basics

In addition to the predefined indicators listed in the Indicator QuickList (page 239), MetaStock provides a robust collection of tools that you can use to create your own indicators. This chapter explains how to create and plot these "custom indicators."

In order to create a custom indicator, you need to be familiar with the MetaStock formula language. For more detailed information on the MetaStock formula language, see page 415.

You can create up to 2,000 different custom indicators.
The indicators are automatically stored by MetaStock so that you do not have to re-enter them each time you want to plot the formula.

The formulas created at the Indicator Builder menu and the formulas used to calculate the built-in indicators (i.e., Stochastics, RSI, etc.) are completely independent of each other. Changes made to the custom indicators will *not* affect the predefined indicators.

The Indicator Builder Dialog

With a chart on the screen, choose Indicator Builder from the Tools menu. The Indicator Builder dialog will appear (the custom indicators appearing in your list will be different than the ones shown below). The Indicator Builder dialog is the jumping off point for creating new custom indicators and/or editing existing custom indicators.

Creating a New Custom Indicator

1. With the Indicator Builder dialog displayed, click the **New** button.
2. Type the name of the formula as *Tutorial*.
3. Click the Display in QuickList checkbox so that the custom indicator will appear in the Indicator QuickList on the standard toolbar.
4. Click in the **Formula** edit box where you can begin writing the actual formula.
5. Type the following formula in the Formula edit box:
   close - mov(close,20,simple)
6. This formula simply subtracts a 20-period simple moving average from the close. For more detailed information on the MetaStock formula language, see page 415.
7. Click the **OK** button to save the new "Tutorial" custom indicator.

Plotting a Custom Indicator

1. Click on the Indicator QuickList (page 239) to display the built-in and custom indicators.
2. Drag the custom indicator named “Tutorial” from the QuickList and drop it on a chart’s title bar. A new inner window will open and plot the results of the custom indicator.

You can distinguish a custom indicator from other indicators in the QuickList by the icon to the left of the custom indicator’s name.

Indicator Builder Dialog

Indicator Builder button

The Indicator Builder dialog is displayed by choosing Indicator Builder from the Tools menu or the Indicator Builder button on the standard toolbar.

New. This displays the Indicator Editor dialog from which you can name and define a new custom indicator.
For more information on the Indicator Editor dialog, see page 284.

Edit. This displays the Indicator Editor dialog from which you can edit the selected custom indicator.
For more information on the Indicator Editor dialog, see page 284.

Copy. This makes a copy of the selected custom indicator in the Indicator Editor dialog. After making any changes, press the **OK** button to save a copy of the custom indicator.
For more information on copying custom indicators, see page 284.

You can select multiple custom indicators by holding down the SHIFT *or* CTRL *key as you click the mouse.*

Delete. This deletes the selected custom indicators.
For more information on deleting custom indicators, see page 284.

Print. This prints the selected custom indicators.
For more information on printing custom indicators, see page 285.

Organize. Use this to display the Formula Organizer Wizard from which you can import and export explorations, system tests, custom indicators, and experts. This is normally used if you have purchased add-on products from Equis or a third party. For more information on the Formula Organizer Wizard, see page 432.

Indicator Editor Dialog

The Indicator Editor dialog is used to create new custom indicators and to edit existing custom indicators.

Name. You can enter a name with up to 50 characters. The name you enter will appear in the inner window title bar when plotted. The list of custom indicators in the Indicator Builder dialog is sorted by name.

Display in QuickList. Check this box if you want the name of the custom indicator to appear in the QuickList. Once in the QuickList, it can be dragged and dropped just like any other indicator (page 239).

Formula. Enter the formula for the custom indicator here. A formula can contain up to 2,500 characters on multiple lines. Press ENTER to place a line break. For tips on using multiple lines, see page 430. For more information on the MetaStock formula language, see page 415.

Functions. This displays the Paste Functions dialog where you can choose from a list of available functions and have the function pasted in the formula. This button is disabled unless your cursor is in the Formula edit box. For more information on pasting functions into formulas, see page 286.

Note: You can use the standard clipboard commands (accelerator keys only) while editing a formula (page 431).

Save Changes

If you click the **Cancel** button while editing a custom indicator, system test, or exploration, you are asked if you want to save the changes. Click **Yes** to save the changes. Click **No** to discard them.

Copying and Deleting Custom Indicators

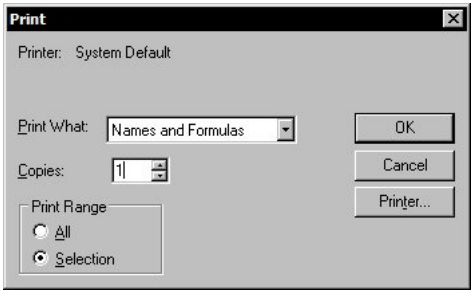
You can make a copy of the selected custom indicator in the Indicator Builder dialog using the **Copy** button. This is useful when you want to design a new custom indicator that is similar to another.

For example, if “Custom Indicator A” was very similar to a new indicator you want to create, you could save time by clicking **Copy** in the Indicator Builder dialog to make a copy rather than rewriting it. You could then do the minor modifications necessary and give it a new name.

You delete the selected custom indicators from the Indicator Builder dialog using the **Delete** button. Clicking the **Delete** button displays the Delete Custom Indicator dialog (page 284).

Printing Custom Indicators

You can print the names and/or formulas of the selected custom indicators to the default printer using the Print dialog. The Print dialog is accessed by clicking **Print** in the Indicator Builder dialog.



Print What. Choose whether you want to print the Names Only or the Names and Formulas for the selected custom indicators.

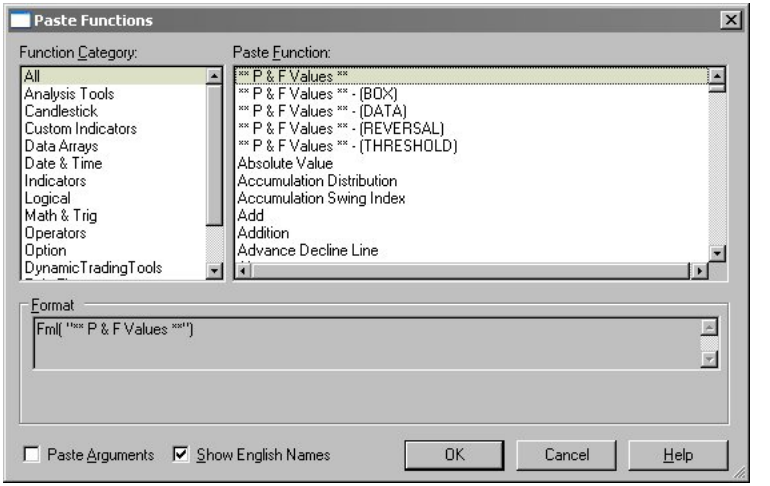
Copies. Choose the number of copies to print.

Print Range. Choose whether you want to print the Selected Custom Indicator(s) or All Custom Indicators.

Printer. This displays a dialog from which you can select the desired printer, orientation, and paper size.

Pasting Functions Into Formulas

Use the **Functions** button at the bottom of the Indicator Editor dialog to paste functions directly into the formula you are editing. Not only does this feature save time, but it also relieves you from having to memorize the functions (or refer to the manual) and their parameters (see page 436 for information on the specific functions available).



The Paste Functions dialog breaks the functions down into 12 categories. The categories are listed in the Function Category list on the left side of the dialog. The functions for the selected category are listed to the right either by their English name or their function name, depending on whether the Show English Names checkbox is checked. MSX DLL's will also be listed as categories, with their included functions. For more information on creating MSX DLL's using the MetaStock Developer's Kit, go to www.equis.com.

As you scroll the Paste Function list, the syntax of the highlighted function is displayed near the bottom of the dialog. To have the of the function arguments pasted, check the Paste Arguments checkbox.

Clicking the **OK** button (or double-clicking the function name) pastes the selected function into the formula at the cursor location.

To paste a function in a formula

1. While editing a formula in the Indicator Editor dialog, click the **Functions** button.
2. Click on a category from the Functions Category list.
3. Double-click the name of the function to paste.

Creating Custom Indicators with Multiple Plots

Many indicators require two or more plots for their correct interpretation. One such indicator is the MACD. The MACD uses a moving average (called the signal line) to generate crossover signals.

Every unassigned expression (i.e., those expressions not assigned to a variable) in a custom indicator will result in a separate plot on the chart. For example, the following formula entered as a custom indicator will result in two plots:

```
DiffOfAvg:= mov(c,39,s)-mov(c,200,s);
DiffOfAvg;
mov(DiffOfAvg, 9,s);
```

The first statement assigns the expression "mov(c,39,s)-mov(c,200,s)" to a variable named "DiffOfAvg."
The second statement results in a plot of DiffOfAvg.
The third statement results in a plot of a 9-period moving average of DiffOfAvg. Notice that each expression must end with a semi-colon.

If you use the fml() function (page 446) to call a custom indicator containing multiple plots, only the last plot in the custom indicator will be returned by the fml() function.

For example, if a formula using the fml() function called the following custom indicator, only the 10-period moving average would be returned, since it is the last plot.

```
mov(close,30,s);
mov(close,20,s);
mov(close,10,s);
```

To change the color of the individual plots of a multiple plot indicator, plot the indicator, then change the properties of each plot.

To change the colors of a multiple plot indicator

1. Plot the indicator from the QuickList or the Indicators dialog.
2. Right-click on the plot that you would like to change.
3. Choose Properties from the shortcut menu.
4. Change the color, then click **OK**.

Creating Custom Indicators that Prompt for Input

Most of the predefined indicators in MetaStock prompt you for input to use during the calculation (e.g., time periods, percent, points, etc.). You can also instruct custom indicators to prompt for input by using a special function called input()(page 451).

The input() function uses the following syntax:

```
input("prompt text",minimum value, maximum
value, default value);
```

Prompt text. This defines the text that is displayed next to the input box. This is used to describe what should be entered.

Minimum value. This is the smallest value that can be entered. If you attempt to enter a value smaller than this value, MetaStock displays a message.

Maximum value. This is the largest value that can be entered. If you attempt to enter a value larger than this value, MetaStock displays a message.

Default value. This is the default value (i.e., the value that will appear in the box when the dialog is initially displayed). Note that the default value is always used when another formula calls the custom indicator using the fml() function (page 446).

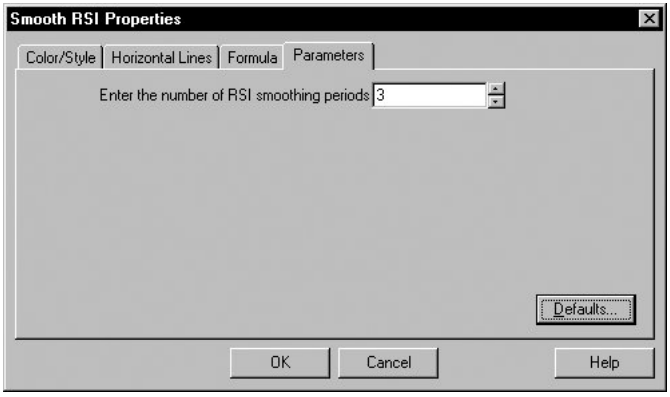
A maximum of six input() functions (page 451) can be used within a custom indicator. MetaStock prompts for all inputs before the custom indicator is calculated, regardless of where the input() functions appears in the custom indicator. You can only use the input() function in custom indicators. System tests, explorations, and experts will not accept the input() function.

Note: If you use the fml() function to call a custom indicator that uses the input() function, you will not be prompted for the inputs in the referenced custom indicator. All inputs in a referenced custom indicator automatically use their default values.

The following custom indicator will prompt you for the number of time periods to use for the moving average (i.e., smoothing periods) of the RSI indicator:

```
SmoothingPeriods:= input("Enter the number of
RSI smoothing periods",1,9,3);
mov(rsi(14), SmoothingPeriods,s);
```

When the custom indicator is plotted, the following input dialog appears prompting you to “Enter the number of RSI smoothing periods”. Note that if your custom indicator required multiple inputs, all of the inputs would appear in this dialog.



In almost all cases you will want to assign the input() function to a variable (as shown in the previous example); otherwise it has very limited use. The input() function cannot be embedded within other functions. For example, the following use of the input() function is not valid:

```
mov(close, input("Enter periods",1,39,10),
simple);
```

However, this can be rewritten using a variable as follows:

```
maperiods:= input("Enter periods",1,39,10);
mov(close,maperiods,simple);
```

The only potential use of the input() function as a stand-alone expression is to plot a horizontal line at a specified value:

```
Input("Plot a horizontal line at ",1,10000,5);
```

This custom indicator will plot a horizontal line at the input value. This may prove useful for those that desire more precision (than the horizontal line study) when drawing support/resistance lines (page 306).

Sample Custom Indicators

This section provides samples of several popular indicators written with the MetaStock formula language. These are simply provided as examples; all of these indicators are standard predefined indicators in MetaStock (i.e., you don't need to create these to plot them). However, these do provide good examples of the MetaStock formula language. For information on interpreting these indicators, see page 303.

Accumulation/Distribution

This Accumulation/Distribution formula uses the cum() function (page 442) to keep a running total of the daily values.

```
cum( (((C-L) - (H-C)) / (H-L)) * V)
```

Bollinger Bands

Bollinger Bands use the stdev() function (page 468) to calculate the upper and lower bands. The middle band is a 20-period simple moving average.

```
Periods:=input("Enter the number of periods:
",5,50,20);
mov(C, Periods, S);
mov( C, Periods, S ) + ( 2 * stdev( C, Periods
));
mov( C, Periods, S ) - ( 2 * stdev( C, Periods
))
```

Chaikin A/D Oscillator

The Chaikin Oscillator can reference the predefined Accumulation/Distribution indicator using the ad() function (page 436) as shown below.

```
ShortMA:= input("Enter shorter moving average
periods",3,10,3);
LongMA:= input("Enter longer moving average
periods",10,30,10);
mov( ad(), ShortMA, E) - mov( ad(), LongMA, E);
```

Or, it can include the actual Accumulation/Distribution formula as shown below.

```
mov(cum((((C-L)-(H-C))/(H-L))*V),3,E)
-mov(cum((((C-L)-(H-C))/(H-L))*V),10,E)
```

Median Price

```
(high + low) / 2
```

Momentum

The Momentum formula uses the ref() function (page 466) to reference the closing price 12 periods ago.

```
(close / ref( close, -12 )) * 100
```

Moving Average MACD

Most analysts (including Equis International's) say that the MACD indicator is "the difference between 12-day and 26-day exponential moving averages." However, the indicator is *really* the difference between 0.15 and 0.075 exponential moving averages (whereas, when expressed in decimal form, the 12- and 26-day exponential moving averages are actually 0.153846 and 0.076923 exponential moving averages). For more information on exponential moving average calculation methods, page 352.

Due to these minor differences in the exponential values, the following formula is slightly different than the predefined MACD indicator. Remember that you can plot the true MACD indicator using the macd() function (page 455).

```
mov( close, 12, E) - mov( close, 26, E)
```

The MACD's trigger (which is a 9-day exponential moving average of the MACD indicator) can be calculated as shown below:

```
mov( macd(), 9, E)
```

Negative Volume Index

You must use the nvi() function (page 459) to calculate the predefined Negative Volume Index. However, a similar indicator can be calculated using the following formula:

```
cum( if( V < ref(V,-1), roc(C,1,%), 0 ))
```

On Balance Volume

The following formula calculates the On Balance Volume indicator:

```
( If( C > Ref( C, -1), 1,
If( C < Ref( C, -1 ), -1, 0 ) ) * VOLUME )
PREV
```

Note: The PREV constant (page 428) represents the value of the indicator on the previous day.

Positive Volume Index

You must use the pvi() function (page 461) to calculate the predefined Positive Volume Index. However, a similar indicator can be calculated using the following formula:

```
cum( if( V > ref(V,-1), roc(C,1,%), 0))
```

Price Oscillator

The following formula calculates a 10-period/20-period exponential Price Oscillator expressed in points:

```
mov( close, 10, E) - mov( close, 20, E)
```

The following formula calculates a 10-period/20-period exponential Price Oscillator expressed in percent:

```
(( mov(C,10,E) - mov(C,20,E) )/mov(C,20,E))
* 100
```

Price Rate-Of-Change

The following formula calculates the 12-period Price Rate-Of-Change:

```
(( C - ref(C,-12)) / ref(C,-12)) * 100
```

The 12-period rate-of-change can also be written using the roc() function (page 466) shown below:

```
roc( close, 12, % )
```

The 12-period rate-of-change can be expressed in “points” using the following formula:

```
close - ref(close, -12)
```

Price Volume Trend

The following formula uses the cum() function (page 442) to calculate the Price Volume Trend:

```
cum( ((C - ref(C,-1)) / ref(C,-1)) * V)
```

This formula also can be written using the roc() function (page 466) as shown below:

```
cum( roc(close, 1, %) * volume )
```

Standard Deviation

A 4-period Standard Deviation indicator can be written as follows. The first statement assigns a 4-period simple moving average to the variable named “4PeriodMA”. The second statement sums the squares of the differences between the moving average and the closing prices on each of the preceding four periods. It then calculates the square root of this total.

```
4periodma:= mov( close, 4, s );
sqrt(( power(4periodma - c, 2) +
power((4periodma)- ref(c,-1), 2) +
power((4periodma)- ref(c,-2), 2) +
power((4periodma)- ref(c,-3), 2) ) / 4 )
```

An easier method is to take the square root of the variance (var()) function (page 473) as shown below:

```
sqrt( var( close, 4 ) )
```

Of course, the easiest way is to write the Standard Deviation formula using the predefined stdev() function (page 468).

Stochastic Momentum Index

The following formula calculates a 13,25,2 Stochastic Momentum Index.

```
100 * ( mov( mov(c - (0.5 * ( hhv(h,13)
+ llv(l,13))),25,e),2,e) / (0.5*mov(
mov( hhv(h,13) - llv(l,13),25,e),2,e)))
```

Stochastic Oscillator

The following formula calculates a 5-period %K Stochastic Oscillator with 3-period slowing:

```
(sum( c - llv(l,5), 3 ) / sum(hhv(h,5)
- llv(l,5), 3) ) * 100
```

This next formula calculates a 3-period %D of the %K in the preceding formula.

```
mov( stoch(5,3), 3, S )
```

Volatility, Chaikin

The Volatility formula shown below uses 10-periods in the moving average and 12-periods in the rate-of-change:

```
roc( mov( high-low, 10, E), 12, %)
```

Volume Oscillator

The following formula calculates a 10-period/20-period exponential Volume Oscillator expressed in points.

```
mov( volume, 10, E) - mov( volume, 20, E)
```

This next formula calculates a 10-period/20-period exponential Volume Oscillator expressed in percent.

```
(( mov(V,10,E) - mov(V,20,E))/mov(V,20,E))
* 100
```

Volume Rate-of-Change

The following formula a 12-period Volume Rate-of-Change indicator.

```
(( V - ref(V,-12)) / ref(V,-12)) * 100
```

This also can be written using the roc() function (page 466) as shown below:

```
roc( volume, 12, % )
```

Weighted Close

The Weighted Close formula multiplies the closing price by two, adds the value of the high and low, and then divides by four.

```
((close * 2) + high + low ) / 4
```

Williams' Accumulation/Distribution

To simplify the explanation of this formula, we will enter it as three formulas. The first statement assigns the "true range" of the high to a variable. Similarly, the second formula assigns the "true range" of the low to a variable. The third statement calculates Williams' A/D indicator.

```
TrueRangeHigh:=max( ref(close,-1), high );
TrueRangeLow:=min( ref(close,-1), low );
cum(if(C > ref(C,-1),C-TrueRangeLow,
if(C < ref(C,-1),C-TrueRangeHigh,0)))
```

Williams' %R

This formula calculates the Williams' %R indicator. Notice that the formula is inverted by multiplying it by -100.

```
NumPeriods:= Input("Enter the number of
periods:",3,50,14);

((HHV(H,NumPeriods) - C)/(HHV(H,NumPeriods)
- LLV(L,NumPeriods))) * -100;
```

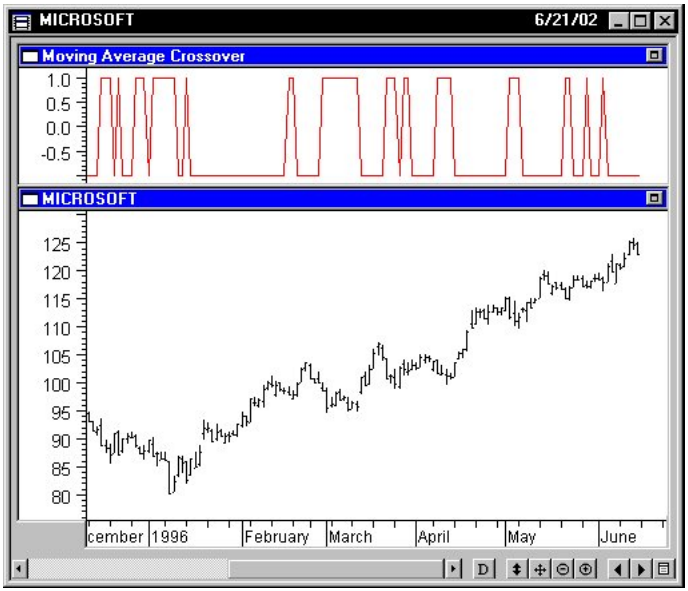
Achelis Binary Waves

This section explains how custom indicators can be used to create "Binary Wave" indicators that display your rating of a security's technical position. Steven Achelis, Founder of Equis International, developed this Binary Wave concept. The Binary Wave concept is somewhat complicated. You should be very familiar with custom indicators before reading this section.

The Binary Wave

A Binary Wave plots +1 or -1, depending on whether the indicator it interprets is bullish or bearish. (The term "Binary Wave" is based on this ±1 concept.) The real power of Binary Waves occurs when multiple Waves are combined into *composite* Binary Waves.

Binary Waves are the opposite of black box trading systems (Although both are considered "expert systems"). *You don't know* the rules or indicators that are used to analyze securities in a black box. Conversely, *you specify* the rules and indicators in a Binary Wave.



Example Binary Waves

The following table shows the rules used in four Binary Wave indicators. (In an effort to keep these examples understandable, we only use four Waves and fairly simple criteria. However, you could, and probably should modify the criteria based on your own expertise.)

Indicator	Bullish	Bearish
MACD	> signal line	<= signal line
Moving Average	close > Moving Avg.	Close <= Moving Avg.
Rate-Of-Change	Rate-Of-Change > 0	Rate-Of-Change <= 0
Stochastic	> 50	<= 50

As shown in this table, we consider the MACD bullish when it is above its signal line and bearish when it is equal to, or falls below, its signal line. Thus, the MACD Binary Wave will plot ±1 depending on whether the MACD is above or below its signal line. This same concept is used to develop three additional Binary Waves that plot ±1 based on the action of the other indicators.

We will then combine the four Binary Waves into a *composite* Binary Wave. When all four Binary Waves are bullish, the value of this composite Binary Wave will be +4; when all four Binary Waves are bearish, its value will be -4; when two are bullish and two are bearish, its value will be zero.

Entering the Example

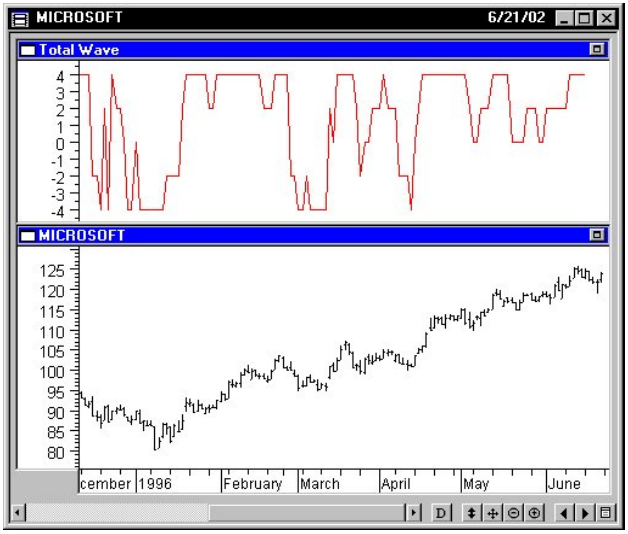
The individual Binary Waves should be assigned to variables in one custom indicator (named “Total Wave”) and then summed together as shown below.

```
MACDWave:=if(macd() > mov(macd(),9,E), +1,
-1);

MovWave:=if(C > mov(C,20,E), +1, -1);

ROCWave:=if(roc(C,12,%) > 0, +1, -1);

StochWave:=if(stoch(5,3) > 50, +1, -1);

MACDWave + MovWave + ROCWave + StochWave
```

The first statement assigns the value “+1” if the MACD indicator is above its 9-period signal line. Otherwise, it assigns “-1”. The second statement assigns “+1” if the close is above its 20-period exponential moving average. Otherwise, it assigns “-1”. The third statement assigns “+1” if the 12-period percent rate-of-change of the closing prices is greater than 0. Otherwise, it assigns “-1”. The fourth statement assigns “+1” if the Stochastic Oscillator is above 50.

Otherwise, it assigns “-1”. The fifth statement combines the preceding four Binary Wave variables into a composite Binary Wave.

The following chart shows the resulting plot:



Note: A good composite Binary Wave will yield results that are superior to the results generated by the individual Binary Waves it incorporates.

Interpreting a Binary Wave

The interpretation of a Binary Wave is fairly obvious: high values are bullish and low values are bearish. (Remember that individual Binary Waves plot as either +1 or -1; the range of composite Binary Waves depends on the number of individual Waves it combines.)

The “Total Wave” system test (shown below) enters long when the indicator rises above zero and sells short when it falls below zero. For more information on creating system tests, see page 507.

```
Name          : Total Wave
Enter Long: fml("Total Wave") < 0
Close Long: fml("Total Wave") > 0
Enter Short: fml("Total Wave") > 0
Close Short: fml("Total Wave") < 0
```

You also could create an “MACD-type” formula by plotting the difference between two moving averages of a composite Binary Wave. Such a formula could be written as follows (name the formula “*Smooth Total Wave*”):

```
mov(fml("Total Wave"), 12, E) - mov(fml("Total
Wave"), 26, E)
```

To give you an idea of what a system test for this formula could look like, the Enter Long rule is shown below:

```
Enter Long: fml("Smooth Total Wave") > 0
```

Enhancements

Many enhancements can be made to Binary Wave formulas. Several of these are discussed below.

The example composite Binary Wave presented on the preceding pages combines four individual Waves. However, you may choose to include many more individual Waves to create your own expert system.

Rather than plotting ±1, you could weight the Binary Waves according to their forecasting ability. For example, one component in a composite Binary Wave could plot ±5 while another component could plot ±0.75.

You can include a long-term component within a composite Binary Wave. For example, you could add the following Binary Wave to the composite "Total Wave" previously presented:

```
if(CLOSE > mov(CLOSE, 200, EXPONENTIAL),
+10, -10)
```

The above formula would add ±10, depending on whether the closing price was above its 200-day moving average. Thus the composite Binary Wave would range between +6 and +14 when this long-term component was bullish, and would range between -6 and -14 when it was bearish. You could then buy long when the composite Binary Wave rose above +10, close your long positions when the composite fell below +10, sell short when the composite fell below -10, and cover your short positions when the composite rose above -10.

You may choose to have composite Binary Wave formulas return multiple values, rather than just ±1. The following formula returns -2 when the Stochastic Oscillator is less than 20, -1 when it is between 20 and 40, 0 when it is between 40 and 60, +1 when it is between 60 and 80, and +2 when it is above 80.

```
if( stoch(5,3) < 20, {then} -2,
 {else} if( stoch(5,3) < 40, {then} -1,
  {else} if( stoch(5,3) < 60, {then} 0,
   {else} if( stoch(5,3) < 80, {then} +1,
    {else} +2))))
```

You may want to smooth a binary wave using a formula similar to the “Smooth Total Wave” and then plot a moving average signal line of the result. A system test could be written to test for crossovers between the indicator and the moving average signal line.

Composite Binary Waves provide a method of rating a security’s technical heAlth based on your criteria. For example, you might consider a composite Wave moderately bullish when it is between 0 and +2.

You can plot the rate-of-change of a composite Binary Wave using the formula shown below:

```
roc( fml("Total Wave"), 1, $)
```

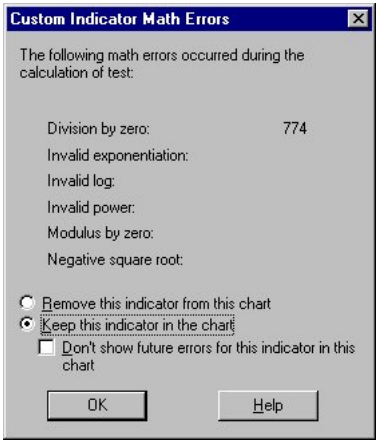
Each time this indicator spikes above zero, it signifies that at least one of the individual Binary Waves has turned bullish. Similarly, spikes below zero show that an indicator has turned bearish.

Summary

Binary Waves display your evaluation of an indicator (e.g., “it is bullish when the MACD is above its 9-period moving average”) as a ±1 indicator. Composite Binary Waves combine multiple Binary Wave indicators to illustrate your analysis of a security based on the actions of numerous indicators.

Math Errors

If you attempt to plot (or execute) a formula that contains math errors, the following dialog will appear prior to plotting the indicator. The dialog shows the number of occurrences for each error.



Division by zero. A formula is dividing a value by zero. For example, the formula "`(ref(close,-1)-open)/(high-low)`" will produce a division by zero error if the high and low are equal.

Invalid exponentiation. A formula produced a math error from the improper use of exponents.

Invalid log. A formula attempted to calculate the log of zero or the log of a negative number. For example, the formula "`log(high-low)`" will produce the error if the high and low are equal.

Invalid power. A formula is attempting to calculate a negative number raised to a power less than one.

Modulus by zero. The second data array of the mod() function results in zero. For example, the formula "`mod(close, high-low)`" will produce the error if the high and low are equal.

Negative square root. A formula is attempting to calculate the square root of a negative number. For example, the formula "`sqrt(open-close)`" will produce an error if the close is higher than the open.

Custom Indicator Error

The Custom Indicator Error dialog will appear if a run-time error occurs while calculating a custom indicator. Any error that is not a "math" error qualifies as a run-time error.

Remove this indicator from the chart. The indicator is removed from the chart so that it will not calculate again.

Keep this indicator in the chart. The indicator will calculate again with the next data update of the chart and any errors that occur will be reported.

Don't show future errors for this indicator in this chart. The indicator will calculate again with the next data update of the chart. Any errors that occur will not be reported. Notice that the errors will be suppressed only for the indicator in the current chart.

Note: This dialog may also appear if you have changed the folder listed on the File Locations page in the Application Properties dialog (page 42).

Line Study and Indicator Interpretation

Indicator Guide

The indicators and line studies found in MetaStock can be divided into six categories. The intent of this guide is to help you develop better trading systems. A robust technical trading system should probably incorporate indicators from several of these categories. Note that some indicators fall into more than one category.

Trend Indicators

The following indicators and line studies can be used to measure trend. *Trend* is a term for the persistence of prices to move in one direction.

Indicator	Creator	Page
Aroon	Chande	308
Commodity Selection Index	Wilder	318
DEMA	Mulloy	321
Directional Movement	Wilder	324
Forecast Oscillator	Chande	331
Linear Regression Indicator		342
Linear Regression Slope		343
Linear Regression Trendline		344
MACD	Appel	345
Moving Averages (all methods)		351
Parabolic SAR	Wilder	366
Performance		366
Polarized Fractal Efficiency	Hannula	368
Price Oscillator		371
Qstick Indicator	Chande	376
r-squared		377
Raff Regression Channel	Raff	379
Standard Deviation Channel	Equis	389
Standard Error		390
Standard Error Bands	Equis (Andersen)	391
Standard Error Channel	Equis	392
TEMA	Mulloy	397
Time Series Forecast		400

Trendlines		402
Vertical Horizontal Filter	White	406
Zig Zag	Merril	413

Volatility Indicators

The following indicators can be used to measure volatility. Volatility is a general term used to describe the magnitude of day-to-day fluctuations in prices (independent of direction). Generally, changes in volatility tend to lead changes in prices.

Indicator	Creator	Page
Average True Range	Wilder	309
Bollinger Bands	Bollinger	310
Commodity Selection Index	Wilder	318
Moving Average (variable)	Chande	354
ODDS™ Probability Cones	Fishback	359
Relative Volatility Index	Dorsey	385
Standard Deviation		388
Standard Error Bands	Equis (Andersen)	391
Volatility, Chaikin's	Chaikin	407
Volatility, Option	Bookstaber	365

Momentum Indicators

The following indicators can be used to measure momentum. Momentum is a general term used to describe the speed at which prices move over a given time period. Generally, changes in momentum tend to lead changes in prices.

Indicator	Creator	Page
Accumulation Swing Index	Wilder	307
Chande Momentum Oscillator	Chande	316
Commodity Channel Index	Lambert	317
Dynamic Momentum Index	Chande	326
Intraday Momentum Index	Chande	338
Linear Regression Slope		343
MACD	Appel	345
Mass Index	Dorsey	348
Momentum Indicator		304
Price Oscillator		371
Price Rate-Of-Change	Appel	371
Random Walk Index	Poulus	379

Range Indicator	Weinberg	380
Relative Momentum Index	Altman	381
Relative Strength Index	Wilder	384
Stochastic Momentum Index	Blau	392
Stochastic Oscillator	Lane	393
Swing Index	Wilder	397
TRIX	unknown	405
Ultimate Oscillator	Williams	406
Williams' %R	Williams	411
Williams' Accumulation/Distribution	Williams	412

Cycle Indicators

The following indicators and line studies can be used to measure cycles. Many securities, particularly futures, show a tendency to move in cyclical patterns. Price changes can often be anticipated at key cyclical intervals.

Indicator	Creator	Page
Cycle Lines		320
Detrended Price Oscillator		324
Fibonacci Time Zones		331
Fourier Transform		332
MESA Sine Wave Indicator	Ehlers	261

Market Strength Indicators

The following indicators can be used to measure market strength. Each of these indicators incorporate either volume or open interest, which are the basic ingredients to the measurement of market strength. Generally higher volume and/or open interest levels indicate more participants and therefore more strength.

Indicator	Creator	Page
Accumulation/Distribution	Williams	306
Demand Index	Sibbet	323
Chaikin Money Flow	Chaikin	315
Chaikin Oscillator	Chaikin	312
Ease of Movement	Arms	327
Herrick Payoff Index	Herrick	335
Klinger Oscillator	Klinger	340
Money Flow Index	Quong/Soudack	350
Moving Average (volume adjusted)	Arms	355

Negative Volume Index	Fosback	358
On Balance Volume	Granville	361
Open Interest		363
Positive Volume Index	Fosback	369
Price Volume Trend		373
Trade Volume Index	Equis (Slauson)	401
Volume		408
Volume Oscillator		409
Volume Rate-Of-Change		410

Support and Resistance Indicators

The following indicators and line studies can be used to measure support and resistance. A common occurrence is for prices to repeatedly rise or fall to a certain level and then reverse. This phenomenon (attributed to basic supply and demand) is called support and resistance.

Indicator	Creator	Page
Andrews' Pitchfork	Andrews	307
Envelope		327
Fibonacci Arcs, Fans, Retracements		330
Gann Lines, Fans, Grids	Gann	333
Projection Bands	Widner	374
Projection Oscillator	Widner	375
Quadrant Lines		377
Speed Resistance Lines		387
Tirone Levels	Tirone	401
Trendlines		402

Accumulation/Distribution

The contents of the Accumulation/Distribution Line are explained in detail under the discussion of the Chaikin Oscillator (page 312). Briefly, the indicator is:

$$\left[\left[\frac{(\text{Close} - \text{Low}) - (\text{High} - \text{Close})}{(\text{High} - \text{Low})}\right] \cdot \text{Volume}\right] + \text{I}$$

Where "I" is yesterday's Accumulation/Distribution value.

References:
- For plotting indicators, see page 237.

- For Accumulation/Distribution parameters, see page 250.

Interpretation

The interpretation of the Accumulation/Distribution Line is similar to the interpretation of On Balance Volume (page 361) wherein the indicator displays the flow of volume into or out of a security. The discussion on the Chaikin Oscillator (page 312) explains the principles behind the Accumulation/Distribution Line.

Tips:

- Please don't confuse the *volume* Accumulation/Distribution indicator with Williams' *price* Accumulation/Distribution indicator (page 412).
- An example custom indicator (page 290) shows how to calculate the Accumulation/Distribution line.

Accumulation Swing Index

The Accumulation Swing Index is a cumulative total of the Swing Index (page 397). Step-by-step instructions on calculating the Swing Index are provided in Wilder's book, *New Concepts In Technical Trading Systems* (page 765).

References:

- For MetaStock plotting indicators, see page 237.
- For Accumulation Swing Index parameters, see page 250.

Interpretation

A breakout is indicated when the Accumulation Swing Index exceeds its value on the day when a previous significant high swing point was made. A downside breakout is indicated when the value of the Accumulation Swing Index drops below its value on a day when a previous significant low swing point was made.

You can confirm trendline breakouts by comparing trendlines on the Accumulation Swing Index to trendlines on the price chart. A false breakout is indicated when a trendline drawn on a price chart is penetrated, but a similar trendline drawn on the Accumulation Swing Index is not penetrated.

Andrews' Pitchfork

Andrews' Pitchfork is a line study consisting of three parallel lines. The lines are drawn from three points that you select.

The three trendlines are drawn as follows: The first trendline begins at the left-most point selected and is drawn so it passes directly

between the right-most points. This line is the handle of the pitchfork. The second and third trendlines are then drawn beginning at the right-most points and are drawn parallel to the first line. These lines are the tines of the pitchfork.

References:
- For general information on drawing line studies, see page 186.
- For Andrews' Pitchfork parameters, see page 195.

Interpretation

The interpretation of a Pitchfork is based on normal trendline support and resistance principles (page 395).

Aroon

The Aroon indicator was developed by Tushar Chande. Aroon is Sanskrit word meaning "dawn's early light" or the change from night to day. The Aroon indicator allows you to anticipate changes in security prices from trending to trading range.

These changes are anticipated by measuring the number of periods that have passed since the most recent x-period high and x-period low. Therefore, the Aroon indicator consists of two plots; one measuring the number of periods since the most recent x-period high (Aroon Up) and the other measuring the number of periods since the most recent x-period low (Aroon Down).

The actual plotted value is a "stochastic" like scale (page 393) ranging from 0 to 100. Assuming a default time-period of 14 days, if a security makes a new 14-day high, the Aroon Up = 100; when the security makes a new 14-day low, the Aroon Down = 100. When the security *has not* made a new high for 14 days, the Aroon Up = 0; when the security *has not* made a new low for 14 days, the Aroon Down = 0.

As explained in the interpretation section for the VHF indicator (page 406) the age-old problem for many trading systems is their inability to determine if a trending or trading range market is at hand. Trend-following indicators such as MACD and moving averages, tend to be whipsawed as markets enter a non-trending congestion phase. On the

other hand, overbought/oversold oscillators (which work well during trading range markets) tend to overreact to price pull-backs during trending markets—thereby closing a position prematurely. The Aroon indicator attempts to remedy this by helping you determine when trend-following or overbought/oversold indicators are likely to succeed.

References:
- For MetaStock plotting indicators, see page 237.
- For Aroon parameters, see page 251.
- For more information on the Aroon indicator see the article written by Tushar Chande in the September 1995 issue of *Technical Analysis of Stocks & Commodities* magazine.

Interpretation

There are basically three conditions that you look for when interpreting the Aroon indicator: extremes at 0 and 100, parallel movement between Aroon Up and Aroon Down, and crossovers between Aroon Up and Aroon Down.

Extremes. When the Aroon Up line reaches 100, strength is indicated. If the Aroon Up remains persistently between 70 and 100, a new uptrend is indicated. Likewise if the Aroon Down line reaches 100, potential weakness is indicated. If the Aroon Down remains persistently between 70 and 100, a new downtrend is indicated.

A strong uptrend is indicated when the Aroon Up line persistently remains between 70 and 100 while the Aroon Down line persistently remains between 0 and 30. Likewise a strong downtrend is indicated when the Aroon Down line persistently remains between 70 and 100 while the Aroon Up line persistently remains between 0 and 30.

Parallel Movement. When the Aroon Up and Aroon Down Lines move parallel with each other (are roughly at the same level), then consolidation is indicated. Expect further consolidation until a directional move is indicated by an extreme level or a crossover.

Crossovers. When the Aroon Down line crosses above the Aroon Up line, potential weakness is indicated. Expect prices to begin trending lower. When the Aroon Up line crosses above the Aroon Down line, potential strength is indicated. Expect prices to begin trending higher.

Average True Range

The True Range indicator is defined by Wilder to be the *greatest* of the following for each period:

- The distance from today's high to today's low.
- The distance from yesterday's close to today's high.
- The distance from yesterday's close to today's low.
- The Average True Range is simply the *average* of the true ranges over the past *x* periods (where *x* is specified by the user).

References:
- For MetaStock plotting indicators, see page 237.

- For Average True Range parameters, see page 251.

Interpretation

In his book, *New Concepts In Technical Trading Systems* (page 765), Wilder defines a trading system that uses the Average True Range. He also provides details on calculating the Average True Range and the trading system.

The Average True Range also can be interpreted using the same techniques that are used with the other volatility indicators. Refer to the discussion on Standard Deviation for additional information on volatility interpretation (page 388).

Bollinger Bands

Bollinger Bands are a type of envelope (page 327) developed by John Bollinger. However, where envelopes are plotted at a fixed percentage above and below a moving average, Bollinger Bands are plotted at standard deviation levels above and below a moving average.

You may find the expert named "Equis - Bollinger Bands" helpful in interpreting Bollinger Bands. For more information on experts, see page 582.

References:

- For MetaStock plotting indicators, see page 237.
- For Bollinger Band parameters, see page 251.
- For information on products and services offered by John Bollinger contact Bollinger Capital Management at 1-310-798-8855.

Interpretation

When displaying Bollinger Bands in MetaStock (page 251), you are prompted to enter the number of periods in the bands and the number of standard deviations between the bands and the moving average. Mr. Bollinger recommends default values of "20" for the number of periods, "simple" for the moving average method, and "2" deviations. He notes that periods of less than 10 periods do not appear to work very well.

MetaStock plots Bollinger Bands on the security's prices or indicator. These interpretational comments refer to bands on the security's closing price.

Because the spacing between Bollinger Bands is based on the standard deviation of the security, the bands widen when the security becomes more volatile, and contract when the security becomes less volatile.

Mr. Bollinger notes the following characteristics of Bollinger Bands.

- Sharp price changes tend to occur after the bands tighten, as volatility lessens.
- When prices move outside the bands, a continuation of the trend is implied.
- Bottoms/tops made outside the bands followed by bottoms/tops made inside the bands call for reversals in the trend.
- A move that originates at one band tends to go all the way to the other band. This observation is useful when projecting price targets.

Tip:
- An example custom indicator (page 290) shows how to calculate Bollinger Bands.

Candlesticks, Japanese

The Japanese developed a method of technical analysis in the 1600s to analyze the price of rice contracts. This technique is called Candlestick charting.

Candlestick charts display the open, high, low, and closing prices in a format similar to a modern-day bar-chart. Articles written by Steven Nison that explain Candlestick charting appeared in the December, 1989 and April, 1990 issues of *Futures* Magazine. The definitive book on the subject is *Japanese Candlestick Charting Techniques*, also by Steve Nison (page 765).

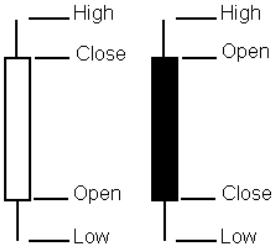
You may find the expert named “Equis - Candlesticks” helpful in interpreting Candlestick patterns. For more information on experts, see page 582.

Some investors are attracted to Candlestick charts by their mystique— maybe they are the “long forgotten Asian secret” to investment analysis. Other investors may be turned-off by their mystique. Regardless of your feelings about the mystique of Candlestick charting, we strongly encourage you to explore their use. Candlestick charts dramatically illustrate supply/demand concepts defined by classical technical analysis theories.

IMPORTANT: Because Candlesticks display the relationship between the open, high, low, and closing prices, they cannot be displayed on securities that only have closing prices, nor were they intended to be displayed on securities that lack opening prices. If you attempt to display a Candlestick chart on a security that does not have opening prices, MetaStock Pro will use the previous period’s closing prices in place of opening prices. This technique can create Candlestick lines and patterns that are not valid (e.g., the

previous period's close may have been outside the current period's high-low range).

This illustration shows the components of the two candlesticks types:



Interpretation

For detailed information on many candlestick patterns, see page 477.

A good way to learn about candlestick patterns is to attach the expert named "Equis - Candlesticks" to a chart.

Candlevolume

Candlevolume charts are a unique hybrid of the Equivolume and Candlestick charting methods. A candlevolume chart possesses the shadows and empty/filled body characteristics of Candlestick charts, plus the volume-based body width of Equivolume charts.
This combination gives you the unique ability to study Candlestick patterns in combination with their volume.

Chaikin A/D Oscillator

The Chaikin Oscillator is created by subtracting a 10-period exponential moving average of the Accumulation/Distribution Line (page 306) from a 3-period moving average of the Accumulation/Distribution Line. The formula equivalent of the calculation is shown below:

```
mov( ad(), 3, E) - mov( ad(), 10, E)
```

References:

- For MetaStock plotting indicators, see page 237.
- For Chaikin Oscillator parameters, see page 252.
- For Exponential Moving Average calculation, see page 352.

Interpretation

The following article by Mr. Marc Chaikin on volume accumulation/ distribution interpretation, is reprinted here with his permission.

> *Technical analysis of both market averages and stocks must include volume studies in order to give the technician a true picture of the internal dynamics of a given market. Volume*

analysis helps in identifying internal strengths and weaknesses that exist under the cover of price action. Very often, volume divergences versus price movement are the only clues to an important reversal that is about to take place. While volume has always been mentioned by technicians as important, little effective volume work was done until Joe Granville and Larry Williams began to look at volume versus price in the late 1960s in a more creative way.

For many years it had been accepted that volume and price normally rose and fell together, but when this relationship changed, the price action should be examined for a possible change of trend. The Granville OBV concept which views the total volume on an up day as accumulation and the total volume on a down day as distribution is a decent one, but much too simplistic to be of value. The reason is that there are too many important tops and bottoms, both short-term and intermediate-term, where OBV confirms the price extreme. However, when an OBV line gives a divergence signal versus a price extreme, it can be a valuable technical signal and usually triggers a reversal in price.

Larry Williams took the OBV concept and improved on it. In order to determine whether there was accumulation or distribution in the market or an individual stock on a given day, Granville compared the closing price to the previous close, whereas Williams compared the closing price to the opening price. He [Williams] created a cumulative line by adding a percentage of total volume to the line if the close was higher than the opening and, subtracting a percentage of the total volume if the close was lower than its opening price. The accumulation/distribution line improved results dramatically over the classic OBV approach to volume divergences.

Williams then took this one step further in analyzing the Dow Jones Industrials by creating an oscillator of the accumulation/distribution line for even better buy and sell signals. In the early 1970s, however, the opening price for stocks was eliminated from the daily newspaper and Williams' formula became difficult to compute without many daily calls to a stockbroker with a quote machine. Because of this void, I created the Chaikin Oscillator substituting the average price of the day for Williams' opening and took the approach one step further by applying

the oscillator to stocks and commodities. The Chaikin Oscillator is an excellent tool for generating buy and sell signals when its action is compared to price movement. I believe it is a significant improvement over the work that preceded it.

The premise behind my oscillator is threefold. The first premise is that if a stock or market average closes above its midpoint for the day (as defined by [high+low]/2), then there was accumulation on that day. The closer a stock or average closes to its high, the more accumulation there was. Conversely, if a stock closes below its midpoint for the day, there was distribution on that day. The closer a stock closes to its low, the more distribution there was.

The second premise is that a healthy advance is accompanied by rising volume and a strong volume accumulation. Since volume is the fuel that powers rallies, it follows that lagging volume on rallies is a sign of less fuel available to move stocks higher.

Conversely, declines are usually accompanied by low volume, but end with panic-like liquidation on the part of institutional investors. Thus, we look for a pickup in volume and then lower lows on reduced volume with some accumulation before a valid bottom can develop.

The third premise is that by using the Chaikin Oscillator, you can monitor the flow of volume into and out of the market. Comparing this flow to price action can help identify tops and bottoms, both short-term and intermediate-term.

*Since no technical approach works all the time, I suggest using the oscillator along with other technical indicators to avoid problems. I favor using a price envelope (*page 327*) around a 21-day moving average and an overbought/oversold oscillator together with the Chaikin Oscillator for the best short and intermediate-term technical signals.*

- *The most important signal generated by the Chaikin Oscillator occurs when prices reach a new high or new low for a swing, particularly at an overbought or oversold level, and the oscillator fails to exceed its previous extreme reading and then reverses direction.*
- *Signals in the direction of the intermediate-term trend are more reliable than those against the trend.*
- *A confirmed high or low does not imply any further price action in that direction. I view that as a non-event.*
- *A second way to use the Chaikin Oscillator is to view a change of direction in the oscillator as a buy or sell signal, but only in the direction of the trend. For example, if we say that a stock that is above its 90-day moving average of price is in an uptrend, then an upturn of the oscillator while in negative territory would constitute a buy signal only if the stock were above its 90-day moving average— not below it.*
- *A downturn of the oscillator while in positive territory (above zero) would be a sell signal if the stock were below its 90-day moving average of closing prices.*

Tips:
- Advanced users can perform variations on the Chaikin Oscillator by changing the "3" and "10" in the following formula (page 282).
  `mov( ad(), 3, E) - mov( ad(), 10, E)`
- An example custom indicator (page 290) also shows how to calculate the Chaikin Oscillator.

Chaikin Money Flow

Like the popular Chaikin A/D Oscillator developed by Marc Chaikin, the Chaikin Money Flow indicator is based on the Accumulation/Distribution line. It is created by summing the values of the Accumulation/Distribution Line for 21 periods and then dividing by a 21 period sum of the volume.

```
sum((( C-L )-( H-C )) / ( H-L ))*V,21 ) /
sum(V,21)
```

References:
- For MetaStock plotting indicators, see page 237.
- For Chaikin Money Flow parameters, see page 252.

Interpretation

The interpretation of the Chaikin Money Flow indicator is based on the assumption that market strength is usually accompanied by prices closing in the upper half of their daily range with increasing volume.

Likewise, market weakness is usually accompanied by prices closing in the lower half of their daily range with increasing volume.

If prices consistently close in the upper half of their daily high/low range on increased volume, then the indicator will be positive (i.e., above the zero line). This indicates that the market is strong. Conversely, if prices consistently close in the lower half of their daily high/low range on increased volume, then the indicator will be negative (i.e., below the zero line). This indicates that the market is weak.

The Chaikin Money Flow indicator provides excellent confirmation signals of trendline and support/resistance breakouts. For example, if a security's prices have recently penetrated a downward sloping trendline (signaling a potential trend reversal), you may want to wait for further confirmation by allowing the Chaikin Money Flow indicator to cross above the zero line. This may indicate an overall Shift from a downtrend to a new uptrend.

A divergence between the Chaikin Money Flow indicator and prices are also significant. For example, if the most recent peak of the indicator is lower than it's prior peak, yet prices are continuing upward, this may indicate weakness.

Chande Momentum Oscillator

The Chande Momentum Oscillator (CMO) was developed by Tushar Chande. A scientist, an inventor, and a respected trading system developer, Mr. Chande developed the CMO to capture what he calls "pure momentum." For more definitive information on the CMO and other indicators we highly recommend the book *The New Technical Trader* by Tushar Chande and Stanley Kroll (page 763).

The CMO is closely related to, yet unique from, other momentum oriented indicators such as RSI, Stochastic, Rate-of-Change, etc. It is most closely related to Welles Wilder's RSI (page 384), yet it differs in several ways:

- It uses data for both up days *and* down days in the numerator, thereby directly measuring momentum.
- The calculations are applied on *unsmoothed* data. Therefore, short-term extreme movements in price are not hidden. Once calculated, smoothing can be applied to the CMO, if desired.
- The scale is bounded between +100 and -100, thereby allowing you to clearly see changes in net momentum using the 0 level. The bounded scale also allows you to conveniently compare values across different securities.

References:
- For MetaStock plotting indicators, see page 237.
- For Chande Momentum Oscillator parameters, see page 252.
- You may find the expert named “Equis - Chande Momentum Oscillator” helpful in interpreting the Chande Momentum Oscillator. For more information on experts, see page 582.

Interpretation

The CMO can be used to measure several conditions.

Overbought/oversold. The primary method of interpreting the CMO is looking for extreme overbought and oversold conditions. As a general rule, Mr. Chande quantifies an overbought level at +50 and the oversold level at -50. At +50, up-day momentum is three times the down-day momentum. Likewise, at -50, down-day momentum is three times the up-day momentum. These levels correspond to the 70/30 levels on the RSI indicator.

You could also establish overbought/oversold entry and exit rules by plotting a moving average trigger line on the CMO. For example, if you are using the default 20-period CMO, a 9-period moving average may serve as a good trigger line. Buy when the CMO crosses above the 9-period trigger line; sell when it crosses below.

Trendiness. The CMO (much like the VHF indicator, page 406) can also be used to measure the degree to which a security is trending. The higher the CMO, the stronger the trend. Low values of the CMO show a security in a sideways trading range.

You may find the CMO helpful in establishing the entry and exit rules of a trend following system. Enter when the CMO is high and exit when it moves lower.

Divergence. Although not specifically mentioned in Mr. Chande’s book, you could also look for divergence between the CMO and the price, as is often done with other momentum indicators. See the discussion about divergence in the Interpretation section of RSI (page 384).

Other. Although not specifically mentioned in Mr. Chande’s book, you may also look for chart formations (head and shoulders, rising wedges, etc.), failure swings, and support/resistance. See the discussion on these methods in the Interpretation section of RSI (page 384).

Commodity Channel Index

The Commodity Channel Index (CCI) is calculated by first determining the difference between the mean price of a commodity

and the average of the means over the time period chosen. This difference is then compared to the average difference over the time period (this factors in the commodity's own inherent volatility). The result is then multiplied by a constant that is designed to adjust the CCI so that it fits into a "normal" trading range of +/-100.

A complete explanation of the CCI is beyond the scope of the manual. Further details on the contents and interpretation of the CCI can be found in the October 1980 issue of *Commodities* magazine (now known as *Futures*). The article was written by Donald Lambert.

The CCI indicator used in older versions of MetaStock is called "CCI (EQUIS)." "CCI (Standard)" is the recently modified version that is consistent with the author's current calculation method. The interpretation of both methods is identical.

References:
- For MetaStock plotting indicators, see page 237.
- For CCI parameters, see page 252.

Interpretation

While the CCI was originally designed for commodities, the indicator also works very well with stocks and mutual funds.

There are two methods of interpreting the CCI:

- **Looking for divergences.** A popular method of analyzing the CCI is to look for divergences in which the underlying security is making new highs while the CCI is failing to surpass its previous highs. This classic divergence is usually followed by a correction in the security's price.
- **As an overbought/oversold indicator.** The CCI usually oscillates between +/-100. Readings outside these ranges imply an overbought/oversold condition.

Commodity Selection Index

The CSI is calculated using the ADXR component of the Directional Movement indicator. Refer to *New Concepts in Technical Trading Systems* (page 765) for more information on the calculation and interpretation of the indicator.

References:
- For MetaStock plotting indicators, see page 237.
- For CSI parameters, see page 253.

Interpretation

A high CSI rating indicates that the commodity has strong trending and volatility characteristics. The trending characteristics are brought out by the Directional Movement factor in the calculation—the volatility characteristic by the Average True Range factor.

Wilder's approach is to trade commodities with high CSI values (relative to other commodities). Because these commodities are highly volatile, they have the potential to make the "most money in the shortest period of time." High CSI values imply trending characteristics, which makes it easier to trade the security.

The CSI is designed for short-term traders who can handle the risks associated with highly volatile markets.

Correlation

The purpose of correlation analysis is to measure the relationship between two variables. This relationship is called the "correlation coefficient."

The correlation coefficient ranges between ±1.0. A coefficient of +1.0 is a perfect positive correlation and -1.0 is a perfect negative correlation. Two variables with no relationship will have a coefficient of zero.

References:
- For MetaStock plotting indicators, see page 237.
- For Correlation parameters, see page 253.

Interpretation

Correlation analysis involves a "dependent" and an "independent" variable. Correlation analysis measures whether or not a change in the independent variable will result in a change in the dependent variable.

A low correlation coefficient (e.g., ±0.10) suggests that the relationship between the two variables is weak or nonexistent. A high correlation indicates that the dependent variable (e.g., the security's price) will change when the independent variable (e.g., an indicator) changes.

The direction of the dependent variable's change depends on the sign of the coefficient. If the coefficient is a positive number, then the dependent variable will move in the same direction as the independent variable; if the coefficient is negative, then the dependent variable will move in the opposite direction of the independent variable.

A useful feature of correlation analysis is its predictive capability, because the correlation coefficient shows how well a change in the independent variable (e.g., an indicator) predicts a change in the dependent variable (e.g., the security's price).

The Correlation indicator can be used in three ways:

- **Correlation of a security's price to an indicator.** You can measure the relationship between an indicator and a security's price. A high positive correlation coefficient means that a change in the indicator usually predicts a change in the security's price. A high negative correlation (e.g., -0.70) means that when the indicator's value changes, the security's price will usually move in the opposite direction. Remember, a low (e.g., 0.10) correlation coefficient indicates that the relationship between the security's price and the indicator is not significant.
- **Correlation of one security to another.** Another use of correlation analysis is to measure the strength of a relationship between two securities. Often, one security's price "leads" or predicts the price of another security. This is especially noticeable with commodities. For example, the correlation coefficient of gold versus the dollar shows a strong negative relationship. In other words, an increase in the dollar usually predicts a decrease in the price of gold.
- **Correlation of one indicator to another.** Another use of correlation analysis is to measure the strength of a relationship between two indicators. Often, one indicator's movement "leads" or predicts the movement of another indicator. For example, a volume-based indicator (i.e., Chaikin Oscillator, Money Flow Index, etc.) may be found to lead a momentum based indicator (i.e., RSI, Stochastic, etc.).

Cycle Lines

Cycles allow us to accurately predict events in nature: bird migrations, the tides, planetary movements, etc. You can also use cycle analysis to predict changes in financial markets, Although not always with the accuracy found in nature.

We know that prices are a consensus of human expectations. These expectations are always changing, Shifting the supply/demand lines (page 395), and causing prices to oscillate between overbought and oversold levels. Fluctuations in prices are a natural process of changing expectations and lead to cyclical patterns.

References:
- For general information on drawing line studies, see page 186.

- For Cycle Line parameters, see page 196.

Interpretation

An obvious example of a cyclical pattern is shown in a chart of a sine wave. Although security prices rarely move with this degree of predictability, even a quick glance at many security charts is enough to see evidence of some type of cyclical pattern.

MetaStock's Cycle Line tool allows you to place equally spaced vertical lines on a chart. Since you can control the spacing between the cycle lines, you may be able to visually extrapolate the cycles evident in a plot. If you extend the right margin of a chart, the cycle lines will extend into the future. This can help you anticipate when the next peak or trough of a cycle may occur.

DEMA

DEMA is a unique smoothing indicator developed by Patrick Mulloy. It was originally introduced in the February 1994 issue of *Technical Analysis of Stocks & Commodities* magazine.

As Mr. Mulloy explains in the article:

> *"Moving averages have a detrimental lag time that increases as the moving average length increases. The solution is a modified version of exponential smoothing with less lag time."*

DEMA is an acronym that stands for **D**ouble **E**xponential **M**oving **A**verage. However, the name of this smoothing technique is a bit misleading in that it is not simply a moving average of a moving average. It is a unique composite of a single exponential moving average and a double exponential moving average that provides less lag than either of the two components individually.

Interpretation

DEMA can be used instead of traditional moving averages. You can use it to smooth price data or other indicators. Some of Mr. Mulloy's original testing of DEMA was done on the MACD. Oddly, he found that the faster responding DEMA-smoothed MACD produced fewer (yet more profitable) signals than the traditional 12/26 smoothed-MACD. A custom indicator named "MACD (DEMA-smoothed)" is included with MetaStock.

This type of smoothing is certainly not limited to the MACD. You may want to experiment on other indicators as well. For

information on TEMA, a similar smoothing method developed by Mr. Mulloy, see page 397.

References:

- For MetaStock plotting indicators, see page 237.
- For DEMA parameters, see page 254.
- For DEMA function syntax, see page 442.
- For Exponential Moving Average calculation, see page 352

Demand Index

The Demand Index, developed by James Sibbet, combines price and volume in such a way that it is often a leading indicator of price change. The Demand Index calculations are too complex, however, for this text. The calculations require 21-column accounting paper to calculate manually.

MetaStock uses a slight variation on the Sibbet's original Index so that the Index is displayed on a "normal" y-axis scale. The author's Index is plotted on a scale labeled +0 at the top, 1 in the middle, and -0 at the bottom. MetaStock uses a scale from +100 to -100. Other than the difference in y-axis labeling, the indicator is calculated exactly as designed by its author.

References:
- For MetaStock plotting indicators, see page 237.
- For Demand Index parameters, see page 254.
- For Demand Index function syntax, see page 443.

Interpretation

There are six "rules" to the Demand Index:

- A divergence between the Demand Index and the price trend suggests an approaching weakness in price.
- One more rally to new highs usually follows an extreme peak in the Demand Index (the Index is performing as a leading indicator).
- Higher prices with a lower Demand Index peak usually coincides with an important top (the Index is performing as a coincidental indicator).
- The Demand Index penetrates the level of zero indicating a change in trend (the Index is performing as a lagging indicator).
- When the Demand Index stays near the level of zero for any period of time, a weak price movement that will not last long is indicated.
- A large long-term divergence between prices and the Demand Index indicates a major top or bottom.

Detrended Price Oscillator

The Detrended Price Oscillator (DPO) is an indicator that attempts to eliminate the trend in prices. Detrended prices allow you to more easily identify cycles and overbought/oversold levels.

The calculation is quite simple; you simply center an x-period moving average by shifting it back x/2 + 1 periods. This centered moving average is then subtracted from the close. The result is an oscillator that crosses above and below zero. Since the DPO is shifted back “x/2 + 1" periods, the last “x/2 + 1" periods will have no values.

MetaStock prompts you to enter the number of periods. The value entered should be the approximate length of the cycle you wish to identify. Cycles longer than the number of periods you enter will not be shown. The default value is 20.

References:
- For MetaStock plotting indicators, see page 237.
- For Detrended Price Oscillator parameters, see page 255.

Interpretation

Long-term cycles are made up of a series of short-term cycles. Analyzing these shorter term components of the long-term cycles can be helpful in identifying major turning points in the longer term cycle. The DPO is helpful in recognizing the underlying cyclical components of the price action.

You may find it helpful to fit cycle lines (page 320) to the DPO to determine the length of the cycles.

Directional Movement

The Directional Movement System, developed by J. Welles Wilder, is explained thoroughly in his book, *New Concepts in Technical Trading Systems* (page 765). MetaStock calculates and plots all five of the indicators that comprise the Directional Movement System (i.e., CSI, +DI, -DI, ADX, and ADXR).

MetaStock also calculates a related indicator, the Commodity Selection Index (page 318).

Wilder’s book gives complete step-by-step instructions (and examples) on calculating and interpreting each of the above indicators.

You may find the expert named “Equis - Directional Movement” helpful in interpreting Directional Movement indicators.For more information on experts, see page 582.

References:
- For MetaStock plotting indicators, see page 237.
- For Directional Movement parameters, see page 255.

Interpretation

The basic Directional Movement trading system involves plotting the 14-period +DI and the 14-period -DI on top of each other in the same inner window (page 247). An improved method of displaying these two indicators is to plot their difference using the following formula:

```
pdi(14) - mdi(14)
```

Positions should be taken by buying when the +DI rises above the -DI (i.e., the formula shown above rises above zero) and selling when the +DI falls below the -DI (i.e., the formula falls below zero). These simple trading rules are qualified with the "extreme point rule." This rule is designed to prevent whipsaws and reduce the number of trades.

The extreme point rule requires that on the day that the +DI and -DI cross, you note the "extreme price." If you are long, the extreme price is the low price on the day the lines cross. If you are short, the extreme price is the high price on the day the lines cross.

The extreme point is then used as a trigger point at which you should implement the trade. For example, after receiving a buy signal (the +DI rose above the -DI), you should then wait until the security's price rises above the extreme point (the high price on the day that the +DI and -DI lines crossed) before buying. If the price fails to rise above the extreme point, you should continue to hold your short position.

In Wilder's book, he notes that this system works best on securities that have a high Commodity Selection Index (CSI) value. He says,

> *"as a rule of thumb, the system will be profitable on commodities that have an ADXR value above 25. When the ADXR drops below 20, then do not use a trend-following system."*

Dynamic Momentum Index

The Dynamic Momentum Index (DMI) was developed by Tushar Chande and Stanley Kroll. The indicator is covered in detail in their book *The New Technical Trader* (page 763).

The DMI is identical to Welles Wilder's RSI (page 384) except the number of periods is variable rather than fixed. The variability of the time periods used in the DMI is controlled by the recent volatility of prices. The more volatile the prices, the more sensitive the DMI is to price changes. In other words, the DMI will use more time periods during quiet markets, and less during active markets. The maximum time periods the DMI can reach is 30 and the minimum is 3. This calculation method is similar to the Variable Moving Average, also developed by Tushar Chande (page 354).

The advantage of using a variable length time period when calculating the RSI is that it overcomes the negative effects of smoothing, which often obscure short-term moves.

The volatility index used in controlling the time periods in the DMI is based on a calculation using a five-period standard deviation and a ten-period average of the standard deviation.

References:

- For MetaStock plotting indicators, see page 237.
- For Dynamic Momentum Index parameters, see page 255.

Interpretation

Chande recommends using the DMI much the same as the RSI. However, because the DMI is more sensitive to market dynamics, it often leads the RSI into overbought/oversold territories by one or two days.

Like the RSI, look for overbought (bearish) conditions above 70 and oversold (bullish) conditions below 30. However, before basing any trade off of strict overbought/oversold levels using DMI or any overbought/oversold indicator, Chande recommends that you first qualify the trendiness of the market using indicators such as r-squared (page 377) or CMO (page 316). If these indicators suggest a non-trending market, then trades based on strict overbought/oversold levels should produce the best results. If a trending market is suggested, you can use the DMI to enter trades in the direction of the trend.

Ease of Movement

The Ease of Movement indicator was developed by Richard W. Arms, Jr., best known for the popular Arms Index and the Equivolume charting method. The Ease of Movement indicator is a product of the Equivolume (page 328) charting method. The Ease of Movement indicator provides one value (for each time period) representing the price and volume for that period. It calculates the ease at which prices are moving. The larger the price move and the lighter the volume, the easier the movement.

Ease of Movement (EMV) is calculated as follows:

$$\text{EMV} = \frac{\text{Midpoint Move}}{\text{Box Ratio}}$$

Where:

$$\textit{Midpoint} = \frac{\textit{Today's High} + \textit{Today's Low}}{2} - \frac{\textit{Yesterday's High} + \textit{Yesterday's Low}}{2}$$

$$\textit{Midpoint} = \frac{\textit{Today's High} + \textit{Today's Low}}{2} - \frac{\textit{Yesterday's High} + \textit{Yesterday's Low}}{2}$$

The raw Ease of Movement values is usually smoothed by a moving average.

References:
- For MetaStock plotting indicators, see page 237.
- For Ease of Movement parameters, see page 256.

Interpretation

The Ease of Movement indicator produces a buy signal when the indicator crosses above the zero center line, indicating that the security is moving upward easily; a sell signal is given when the indicator crosses below the zero center line, indicating that the security is moving downward easily.

High ease of movement values correspond with easy upward price movement whereas low ease of movement values correspond with easy downward price movement. When price movement is small on heavy volume, the ease of movement indicator is zero.

Envelope

An envelope is comprised of two moving averages (page 351). One moving average is shifted upward and the second moving average is shifted downward. The envelope is plotted around a price plot or indicator.

References:
- For MetaStock plotting indicators, see page 237.

- For Envelope parameters, see page 256.

Interpretation

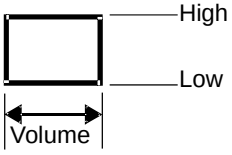
Envelopes define the upper and lower boundaries of a security's normal trading range. A sell signal is generated when the security reaches the upper band, whereas a buy signal is generated at the lower band. The optimum percentage shift depends on the volatility of the security— the more volatile, the larger the percentage. The logic behind envelopes is that overzealous buyers and sellers push the price to the extremes (i.e., the upper and lower bands), at which point the prices often stabilize by moving to more realistic levels. This is similar to the interpretation of Bollinger Bands (page 310).

Equivolume

Developed by Richard W. Arms, Jr., and explained in his book *Volume Cycles in the Stock Market* (page 763), Equivolume presents a highly informative picture of market activity for stocks, futures, and indices.

Equivolume departs from other charting methods with its emphasis on volume as an equal partner with price. Instead of being displayed as an "afterthought" on the lower margin of a chart, volume is combined with price in a two-dimensional box. The top line of the box is the high for the period and the bottom line is the low for the period. The width of the box is the unique feature of Equivolume charting; it represents the volume of trading for the period.

The width of the box is controlled by a normalized volume value. The volume for an individual box is normalized by dividing the actual volume for the period by the total of all volume displayed on the chart. Therefore, the width of each Equivolume box is based on a percentage of total volume, with the total of all percentages equaling 100.



This illustration shows the components of an Equivolume box:

The resulting charts represent an important departure from all other analytical methods, in that time becomes less important than volume in analyzing price moves. It suggests that each movement is a function of the number of shares or contracts changing hands rather than the amount of time elapsed.

Perhaps the Equivolume charting method is best summed up by the developer himself as follows:

> *"If the market wore a wristwatch, it would be divided into shares, not hours."*

Interpretation

The shape of each Equivolume box provides a picture of the supply and demand for the security during a specific trading period. Short and wide boxes (i.e., small change in price combined with heavy volume) tend to be seen at turning points, while tall and narrow boxes (i.e., large change combined with low volume) are more likely to be seen during continuing moves.

Especially important are boxes which penetrate old support or resistance levels, since it takes "power" to create a reliable penetration. A "power box" is one in which both height and width increase substantially. Lack of box width, due to light volume, puts the validity of a breakout in question.

The more volume in a top or bottom consolidation, the larger the ensuing move is likely to be. Volume is directly observable on an Equivolume chart by noting the overall width of the consolidation.

For an in-depth understanding of Equivolume, we recommend the book *Volume Cycles in the Stock Market* by the developer, Richard W. Arms, Jr. (page 763).

Fibonacci Studies

Leonardo Fibonacci was an important mathematician who was born in Italy around the year 1170. It is rumored that Fibonacci discovered the relationship of what are now referred to as Fibonacci numbers while studying the Great Pyramid of Giza in Egypt.

Fibonacci numbers are a sequence of numbers in which each successive number is the sum of the two previous numbers:

1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, 377, 610, etc.

These numbers possess an intriguing number of interrelationships, such as the fact that any given number is approximately 1.618 times the preceding number and any given number is approximately 0.618 times the following number. The booklet *Understanding Fibonacci Numbers* by Edward Dobson (page 764) contains a good discussion of these interrelationships.

References:

- For general information on drawing line studies, see page 186.
- See also Fibonacci Arcs (page 330), Fans (page 330), Retracements (page 330), and Time Zones (page 331).

Interpretation

MetaStock has four Fibonacci studies: arcs, fans, retracements, and time zones. The general interpretation of the Fibonacci studies

involves the anticipation of a change in trend as prices near the lines created by the Fibonacci studies.

Arcs

The calculation and interpretation of Fibonacci Arcs is similar to that of Fibonacci Fan Lines. First, a trendline is drawn between two extreme points. MetaStock then draws three arcs, centered on the second extreme point, that intersect the trendline drawn between the two extreme points at the Fibonacci levels of 38.2%, 50.0%, and 61.8%.

The interpretation of Fibonacci Arcs involves looking for, or anticipating, support and resistance as prices approach the arcs. A common technique is to display both Fibonacci Arcs and Fibonacci Fan Lines and to anticipate support/resistance at the points where the Fibonacci studies cross.

The points where the Arcs cross the price data will vary depending on the scaling, because the Arcs are drawn so they always appear circular relative to the computer screen. For information on Fibonacci Arc parameters, see page 203.

Fans

Fibonacci Fan Lines are displayed by first drawing a trendline between two extreme points. MetaStock then draws an invisible vertical line through the second extreme point. This vertical line is then divided at the Fibonacci levels of 38.2%, 50.0%, and 61.8%. Finally, three trendlines are drawn from the first extreme point so they pass through the invisible vertical line at the above three levels. (This technique is similar to the method used to calculate Speed Resistance Lines; for more information, see page 387.)
For information on Fibonacci Fan parameters, see page 204.

Projections

Fibonacci Projections are displayed by first drawing a trendline between two extreme points (i.e., a significant trough and peak). After selecting Fibonacci Projection from the Insert menu, a series of three horizontal lines will be drawn at the Fibonacci levels of 0.618, 1.0 and 1.618.

For information on Fibonacci Projection parameters, see page 206.

Retracements

Fibonacci Retracements are displayed by first drawing a trendline between two extreme points (i.e., a significant trough and peak). After selecting Fibonacci Retracement from the Insert menu, a series of up to nine horizontal lines will be drawn at the Fibonacci levels of 0.0%, 23.6%, 38.2%, 50.0%, 61.8%, 100%, 161.8%, 261.8%, and 423.6%.

After a significant move (either up or down), prices will often rebound and retrace a significant portion (if not all) of the original move. As the price retraces, support and resistance levels will often occur at or near the Fibonacci Retracement levels. For information on Fibonacci Retracement parameters, see page 209.

Time Zones

The Fibonacci Time Zones command displays vertical lines at the Fibonacci intervals of 1, 2, 3, 5, 8, 13, 21, 34, etc. The interpretation of Fibonacci Time Zones involves looking for significant changes in price near the vertical lines. For information on Fibonacci Time Zone parameters, see page 212.

Forecast Oscillator

The Forecast Oscillator is an extension of the linear regression based indicators made popular by Tushar Chande. The Forecast Oscillator plots the percentage difference between the forecast price (generated by an x-period linear regression line) and the actual price. The oscillator is above zero when the forecast price is greater than the actual price. Conversely, it's less than zero if its below. In the rare case when the forecast price and the actual price are the same, the oscillator would plot zero.

For more on linear regression analysis see the entries on Envelopes (page 330), Fibonacci Studies (page 329), and Speed Resistance Lines (page 387).

Interpretation

Actual prices that are persistently below the forecast price suggest lower prices ahead. Likewise, actual prices that are persistently above the forecast price suggest higher prices ahead. Short-term traders should use shorter time periods and perhaps more relaxed standards for the required length of time above or below the forecast price. Long-term traders should use longer time periods and perhaps stricter standards for the required length of time above or below the forecast price.

Chande also suggests plotting a three-day moving average trigger line of the Forecast Oscillator to generate early warnings of changes in trend. When the oscillator crosses below the trigger line, lower prices are suggested. When the oscillator crosses above the trigger line, higher prices are suggested. For information on Forecast Oscillator parameters, see page 257.

Fourier Transform

It is beyond the scope of the manual to provide a full explanation of Fourier analysis. Further information can be found in *Technical Analysis of Stocks & Commodities* magazine (TASC), Volume One issues #2, #4, and #7; Volume Two issue #4; Volume Three issues #2 and #7 (Understanding Cycles); Volume Four issue #6; Volume Five issues #3 (In Search of the Cause of Cycles) and #5 (Cycles and Chart Patterns); and Volume Six issue #11 (Cycles).

Fourier Transforms were originally developed as an engineering tool to study repetitious (cyclical) phenomena such as the vibration of a stringed musical instrument or an airplane wing during flight.

The complete analysis concept is called spectral analysis. Fast Fourier Transform (FFT) is an abbreviated calculation that computes in seconds rather than minutes. The FFT sacrifices phase relationships and concentrates only on cycle length and amplitude (strength).

The benefit of FFT is its ability to extract the predominate cycle(s) from a series of data (e.g., an indicator or a security's price).

FFTs are based on the principal that any finite, time-ordered set of data can be approximated arbitrarily well by decomposing the data into a set of sine waves. Each sine wave has a specific cycle length, amplitude, and phase relationship to the other sine waves.

Problems occur when applying FFT analysis to security price data because FFTs were designed to be applied to non-trending, periodic data (whereas security price data tends to be trending). This is overcome by "detrending" the data using either a linear regression trendline or a moving average.

Security data is not truly periodic, since securities are not traded on weekends and some holidays. MetaStock removes these discontinuities by passing the data through a smoothing function called a "hamming window."

References:
- For MetaStock plotting indicators, see page 237.
- For Fourier Transform parameters, see page 257.

Interpretation

As stated at the beginning of this section, it is beyond the scope of the manual to provide complete interpretation of FFT analysis. The remainder of this section explains the interpretation of MetaStock's Interpreted FFT.

The Interpreted FFT displays an indicator that shows the three predominate cycle lengths and the relative strength (i.e., the relative amplitudes) of the cycles.

The Interpreted FFT indicator is always displayed from the most significant cycle to the least significant cycle. The longer the indicator remains at a specific cycle length, the more predominate it was in the data being analyzed.

Once you know the predominate cycle length, you may want to use it as a parameter for other indicators. For moving averages, use 1/2 of the cycle length for the optimum number of periods. For example, if you know that a security has a 40-day cycle, you may want to plot a 20-day moving average.

Gann Studies

W. D. Gann (1878-1955) designed several unique techniques for studying price charts. Central to Gann's techniques was the use of geometric angles in conjunction with time and price. Gann believed that specific geometric patterns and angles had unique characteristics that could be used to predict price action.

All of Gann's techniques require that equal time and price intervals be used on the charts, so that a rise/run of 1 x 1 will always equal a 45-degree angle.

Gann believed that the ideal balance between time and price exists when prices rise or fall at a 45 degree angle relative to the time axis. This is also called a 1 x 1 angle (i.e., prices rise one price unit for each time unit).

References:

- For plotting MetaStock line studies, see page 186.
- For Gann Study parameters, see page 213.

Interpretation

Gann Angles are drawn between a significant bottom and top (or vice versa) at various angles. Deemed the most important by Gann, the 1 x 1 trendline signifies a bull market if prices are above the trendline or a bear market if below. Gann felt that a 1 x 1 trendline provides major support during an uptrend and when the trendline is broken, it signifies a major reversal in the trend. Gann identified nine significant angles, with the 1 x 1 being the most important:

1 x 8 - *82.5 degrees*
1 x 4 - *75 degrees*
1 x 3 - *71.25 degrees*
1 x 2 - *63.75 degrees*
1 x 1 - ***45 degrees***
2 x 1 - *26.25 degrees*
3 x 1 - *18.75 degrees*
4 x 1 - *15 degrees*
8 x 1 - *7.5 degrees*

Notice that in order for the rise/run values (e.g., 1 x 1, 1 x 8, etc.) to match the actual angles (in degrees), the x- and y-axes must have equally spaced intervals. This means that one unit on the x-axis (i.e., hour, day, week, month, etc.) must be the same distance as one unit on the y-axis. The easiest way to calibrate the chart is make sure that a 1 x 1 angle produces a 45 degree angle.

Gann observed that each of the angles can provide support and resistance depending on the trend. For example, during an uptrend the 1 x 1 angle tends to provide major support. A major reversal is signaled when prices fall below the 1 x 1 angled trendline. According to Gann, prices should then be expected to fall to the next trendline (i.e., the 2 x 1 angle). In other words, as one angle is penetrated, expect prices to move and consolidate at the next angle.

Gann developed several techniques for studying market action. These include Gann Lines, Gann Fans, and Gann Grids.

Herrick Payoff Index

The Herrick Payoff Index is used to analyze futures and commodities. Because the Index uses open interest in its calculations, the security must contain open interest.

Briefly, the calculation of the Herrick Payoff Index involves computing the mean price for each day and then using this information to compute the difference in mean prices for each day. The flow of money into, or out of, the commodity is then computed by multiplying the change in the mean prices by the day's volume to arrive at a total change in dollars for the day. MetaStock uses the dollar value of a one cent move (input by the user) to modify the "money flow" by changes in open interest. The daily values of the "modulated dollar amount" are then smoothed with an exponential moving average.

According to Herrick, the recommended input for "the value of a one cent move" is "100" for most commodities. The only exception is for Silver, which should be "50." Before the Herrick Payoff Index is calculated, you will be prompted to enter a smoothing factor known as the "multiplying factor." The multiplying factor is part of a complex smoothing mechanism. However, the results are similar to the smoothing obtained by a moving average. For example, a multiplying factor of ten produces results similar to a 10-period moving average.

References:
- For MetaStock plotting indicators, see page 237.
- For Herrick Payoff Index parameters, see page 258.
- For Exponential Moving Average calculation, see page 352

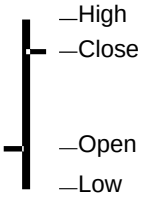
Interpretation

The interpretation of the Herrick Payoff Index involves visually comparing the action of the Index with the price while looking for divergences and convergences. An example divergence would be increasing prices while the Index is falling. An example convergence would be decreasing prices while the Index is rising.

Tip:
- Open interest is usually not available for the most recent day. Thus, the right most data point of the Herrick Payoff Index is usually blank.

High/Low/Close Bar

A bar chart is the most popular way to display security prices. A bar chart is made up of vertical bars, with each bar representing the price movement for a time period (i.e., hour, day, week, month, etc.). Hash marks on the left and right sides of the bar represent the opening and closing prices respectively. The top of the bar represents the high price and the bottom of the bottom represents the low price.



Interpretation

Bar charts, by themselves are used to view the movement of the security's prices over a specific time period. Indicators (page 237) and line studies (page 185) can be displayed along with bar charts to help determine the future direction of the security's price.

Ichimoku Kinko Hyo

The Ichimoku Kinko Hyo was developed by Goichi Hosoda, a Japanese newspaper writer, writing under the pen name "Ichimoku Sanjin." He developed this charting technique before World War II, and offered it to the public when he published his book in 1969.

Ichimoku translates as "a glance" or "one look." Kinko Hyo translates as "the table of equilibrium" or "balance table." Hence a chart displaying this indicator provides a broad look at the prices in a single view. You should be able to look at the chart and know at a glance whether to buy or sell.

Three key time periods are used to calculate the five individual plots used in the indicator. These time periods are based on the trading conditions at the time the indicator was created: Japan in the 1930's. At the time, a trading week was six days instead of the five days we are used to today. Some traders may wish to alter the time periods to reflect the change in trading days.

- 9 periods = one and a half weeks (now 7.5 periods. use 7 or 8)
- 26 periods = one month (now 22 periods)
- 52 periods = two months (now 44 periods)

The Ichimoku Kinko Hyo indicator is composed of the following five plots, in addition to the closing prices.

Tenkan-sen. The standard line. This plot provides signals when paired with the Kijun-sen. The default period value for this plot is 9. The calculation for this plot is (Highest High + Lowest Low)/2. The highest high is the highest high over the last specified number of time periods. By default, this is the highest high of the last 9 periods. The other highest highs and lowest lows are calculated the same way.

Kijun-sen. The turning line. This plot provides signals when paired with the Tenkan-sen. The default period value for this plot is 26. The calculation for this plot is also (Highest High + Lowest Low)/2. However, the values are taken from a 26-period time frame instead of a 9-period time frame.

Senkou Span A. The first span. This plot creates the Kumo (cloud) when paired with Senkou Span B. The default period value for this plot is 52. The calculation for this plot is (Tenkan-sen + Kijun-sen)/2.

Senkou Span B. The second span. This plot creates the Kumo (cloud) when paired with Senkou Span A. The default period value for this plot is 52. The calculation for this plot is (Highest High + Lowest Low)/2.

Chikou Span. The delayed line. This plot is simply the close, plotted the desired number of time periods in the past. The default period value for this plot is 26. In this case, today's close would be plotted 26 days ago.

Interpretation

The Ichimoku indicators are used together as one set of signals. If the signals do not agree, the chart is unreliable. When all three signals are in agreement, the signal is strong.

Tenkan-sen / Kijun-sen. A buy signal is generated when the Tenkan-sen crosses above the Kijun-sen. A sell signal is generated when the Tenkan-sen crosses below the Kijun-sen. The Tenkan-sen and Kijun-sen can be used as support and resistance.

Senkou Span A / Senkou Span B. The area between the two Spans is the Kumo, or cloud. A buy signal is generated when the close crosses above the cloud. A sell signal is generated when the close crosses below the cloud. Near the intersections of Span A and Span B, the market has a tendency to become chaotic. The Senkou Spans can also be used as support or resistance. When the close is above the cloud, the Spans act as two levels of support. When the close is below the cloud, the Spans act as two levels of resistance.

Chikou Span / Close. A buy signal is generated when the Chikou Span crosses above the close. A sell signal is generated when the Chikou Span crosses below the close.

Inertia

The Inertia indicator was developed by Donald Dorsey. It was originally introduced in the September 1995 issue of *Technical Analysis of Stocks & Commodities* (TASC) magazine. It is an outgrowth of Dorsey's Relative Volatility Index (page 385).

Dorsey chose the name "Inertia" because of his definition of a trend. He asserts that a trend is simply the "outward result of inertia." It takes significantly more energy for a market to reverse direction than to continue along the same path. Therefore a trend is a measurement of market inertia.

In physics, inertia is defined in terms of mass and direction of motion. Using technical analysis to analyze security prices, the direction of motion is easily defined. However, mass is not so easily defined. Dorsey asserts that "volatility" may be the simplest and most accurate measurement of inertia. This theory led him to use the Relative Volatility Index (RVI) as the basis for a trend indicator.

In charting, inertia is simply a smoothed RVI. The smoothing mechanism is a Linear Regression indicator (page 342). The RVI helps measure the general direction of volatility. Dorsey found that by smoothing the RVI, a good long-term trend indicator resulted.

References:

- For MetaStock plotting indicators, see page 237.
- For Inertia parameters, see page 258.

Interpretation

If the Inertia indicator is above 50, positive inertia is indicated. The long-term trend is up and should remain up as long as the indicator is above 50. If it's below 50, negative inertia is indicated. The long-term trend is down and should remain down as long as the indicator is below 50.

Intraday Momentum Index

The Intraday Momentum Index (IMI) was developed by Tushar Chande. It is a crossbreed between the RSI (page 384) and Candlestick analysis (page 311). For more information on the IMI, refer to the book *The New Technical Trader* by Tushar Chande and Stanley Kroll (page 763).

The calculation of the IMI is very similar to the RSI, except it uses the relationship between the intraday opening and closing prices to determine whether the day is "up" or "down." If the close is above the open, it is an up day. If the close is below the open it is a down day.

Therein lies its tie to candlestick charting. For those familiar with candlestick charting, the IMI separates the black and white candlesticks and performs a RSI calculation on the candlestick bodies.

References:
- For MetaStock plotting indicators, see page 237.
- For Intraday Momentum Index parameters, see page 259.

Interpretation

Overbought/oversold. Index values above 70 indicate a potential overbought situation with lower prices ahead. Values below 30 indicate a potential oversold situation with higher prices ahead. As with all overbought/oversold indicators, you should first quantify the trendiness of the market before acting on the signals. Indicators like the VHF (page 406), CMO (page 316), and r-squared (page 377) can be used to gauge the trendiness of the market.

Divergences. The basic premise behind the IMI, is that shifts in intraday momentum lead shifts in interday momentum. Look for divergences between the indicator and the price action. If the price trends higher (lower) and the IMI trends lower (higher), then a reversal may be imminent.

Candlestick Confirmation. The IMI is useful in confirming candlestick patterns. For example, before acting on a bullish candlestick pattern such as the Engulfing Bullish Lines (page 482), you may want to confirm the bullishness with the IMI.

Kagi

Kagi charts are thought to have been created around the time the Japanese stock market started trading in the 1870s. Kagi charts were introduced to the western world by Steve Nison (a well-known authority on the Candlestick charting method). Kagi charts display a series of connecting vertical lines where the thickness and direction of the lines are dependent on the price action. If closing prices continue to move in the direction of the prior vertical Kagi line, that line is extended. However, if the closing price reverses by a predetermined “reversal” amount, a new Kagi line is drawn in the next column in the opposite direction. An interesting aspect of the Kagi chart is that when closing prices penetrate the prior column’s high or low, the thickness of the Kagi line changes.

To draw Kagi lines, compare the close to the ending point of the last Kagi line. If the price continues in the same direction as the prior line, the line is extended in the same direction, no matter how small the move. However, if the closing price moves in the opposite direction by the reversal amount or more (this could take a number of sessions), then a short horizontal line is drawn to the next column

and a vertical line is continued to the new closing price. If the closing price moves in the opposite direction of the current column by less than the reversal amount then no lines are drawn.
In addition, if a thin Kagi line exceeds the prior high point (on the Kagi chart), the line becomes thick. Likewise, if a thick Kagi line breaks a prior low point, the line becomes thin.

Interpretation

Kagi charts are an excellent way to view the underlying supply and demand of a security. A series of thick lines shows that demand is exceeding supply (a rally); a series of thin lines shows that supply is exceeding demand (a decline); and a series of Alternating thick and thin lines shows that the market may be in a relative state of equilibrium (i.e., supply equals demand).

The most basic trading technique for Kagi charts is to buy when the Kagi line changes from thin to thick and to sell when the Kagi line changes from thick to thin.

A sequence of higher highs and higher lows on Kagi charts shows the underlying force of the bulls. As a general rule of thumb, eight to 10 higher highs on a Kagi chart often coincides with an overextended market (i.e., a downside reversal may be imminent). Whereas, lower highs and lower lows may reflect an underlying weakness.

Indicators calculated on Kagi charts use all the data in each column and then display the average value of the indicator for that column. For more in-depth coverage of the Kagi charting method, we recommend the book *Beyond Candlesticks* by Steve Nison (page 765).

Klinger Oscillator

The Klinger Oscillator (KO) was developed by Stephen J. Klinger. Learning from prior research on volume by such well-known technicians as Joseph Granville, Larry Williams, and Marc Chaikin, Mr. Klinger set out to develop a volume-based indicator to help in both short- and long-term analysis.

The KO was developed with two seemingly opposite goals in mind: to be sensitive enough to signal short-term tops and bottoms, yet accurate enough to reflect the long-term flow of money into and out of a security.

The KO is based on the following tenets:

- Price range (i.e. High - Low) is a measure of movement and volume is the force behind the movement. The sum of High + Low + Close defines a trend. Accumulation occurs when today’s sum is greater than the previous day’s. Conversely, distribution occurs

when today's sum is less than the previous day's. When the sums are equal, the existing trend is maintained.

- Volume produces continuous intraday changes in price reflecting buying and selling pressure. The KO quantifies the difference between the number of shares being accumulated and distributed each day as "volume force." A strong, rising volume force should accompany an uptrend and then gradually contract over time during the latter stages of the uptrend and the early stages of the following downtrend. This should be followed by a rising volume force reflecting some accumulation before a bottom develops.
- By converting the volume force into an oscillator representing the difference between a 34-period and 55-period exponential moving average with a 13-period trigger, the force of volume into and out of a security can easily be tracked. Comparing this force to price action can help identify divergences at tops and bottoms.

References: For MetaStock plotting indicators, see page 237.

Interpretation

Mr. Klinger recommends the following guidelines for using the KO:

1. The most reliable signals occur in the direction of the prevailing trend. Strict stop guidelines (i.e., failure to penetrate the zero line or a violation of the trigger line) should remain in force.
2. The most important signal occurs when the KO diverges with the underlying price action, especially on new highs or new lows in overbought/oversold territory. For example, when a stock makes a new high or low for a cycle and the KO fails to confirm this, the trend may be losing momentum and nearing completion.
3. If the price is in an uptrend (i.e., above an 89-day exponential moving average), buy when the KO drops to unusually low levels below zero, turns up, and crosses its trigger line. If the price is in a downtrend (i.e., below an 89-day exponential moving average), sell when the KO rises to unusually high levels above zero, turns down, and crosses its trigger line.

While the KO works well for timing trades in the direction of the trend, it is less effective against the trend. This can create problems for the trader trying to "scalp" a trade against the prevailing trend. However, when the KO is used in conjunction with other technical indicators, better results can be achieved. Williams' %R (page 411) is recommended for confirming an overbought/oversold price condition and Gerald Appel's MACD (page 345) is recommended for confirming the short-term direction of price.

Tip: • Stephen Klinger suggests the following formula for viewing the cumulative flow of money into and out of a security:

```
cum(kvo())
```

Plot a 13-period moving average of the formula as a trigger line for entering buy and sell trades. (For information on creating formulas, see page 415.)

Line Chart

A line chart is the simplest type of chart. One price (typically the close) is plotted for each time period (i.e., day, week, month, etc.). A single, unbroken line connects each of these price points.

Interpretation

Line charts, by themselves are used to view the movement of the security's prices over a specific time period. Indicators (page 237) and line studies (page 185) can be displayed along with line charts to help determine the future direction of the security's price.

A line chart's strength comes from its simplicity. It provides an uncluttered, easy to understand view of a security's price. Line charts are typically displayed using a security's closing prices.

Linear Regression Indicator

The Linear Regression indicator is based on the trend of a security's price over a specified time period. The trend is determined by calculating a linear regression trendline using the "least squares fit" method. The least squares fit technique fits a trendline to the data in the chart by minimizing the distance between the data points and the linear regression trendline.

Any point along the Linear Regression indicator is equal to the ending value of a Linear Regression trendline. For example, the ending value of a Linear Regression trendline that covers 10 days will have the same value as a 10-day Linear Regression indicator. This differs slightly from the Time Series Forecast indicator (page 400) in that the TSF adds the slope to the ending value of the regression line. This makes the TSF a bit more responsive to short term price changes. If you plot the TSF and the Linear Regression indicator side-by-side, you'll notice that the TSF hugs the prices more closely than the Linear Regression indicator. Rather than plotting a straight Linear Regression trendline, the Linear Regression indicator plots the ending values of multiple Linear Regression trendlines.

References: • For MetaStock plotting indicators, see page 237.

• For Linear Regression indicator parameters, see page 259.

Interpretation

The interpretation of a Linear Regression indicator is similar to a moving average. However, the Linear Regression indicator has two advantages over moving averages.

- Unlike a moving average, a Linear Regression indicator does not exhibit as much "delay." Since the indicator is "fitting" a line to the data points rather than averaging them, the Linear Regression line is more responsive to price changes.
- The indicator is actually a forecast of the next periods (tomorrow's) price plotted today. The Forecast Oscillator plots the percentage difference between the forecast price and the actual price. Tushar Chande suggests that when prices are persistently above or below the forecast price, prices can be expected to snap back to more realistic levels. In other words the Linear Regression indicator shows where prices should be trading on a statistical basis. Any excessive deviation from the regression line should be short-lived.

Linear Regression Slope

The Linear Regression method provides several useful outputs for technical analysts, including the Slope. The slope shows how much prices are expected to change per unit of time. Some may remember this as "rise over run."

References:
- For MetaStock plotting indicators, see page 237.
- For Linear Regression Slope parameters, see page 260.

Interpretation

It is helpful to consider Slope in relation to r-squared (page 377). While slope gives you the general direction of the trend (positive or negative), r-squared gives you the strength of the trend. A high r-squared value can be associated with a high positive or negative slope.

When the Slope of the trend first becomes significantly positive, you could open a long position. You could sell, or open a short position when the slope first becomes significantly negative. You should refer to the table below to determine when a trend is deemed "significant." For example, if the 14-period slope has recently turned from negative to positive (i.e., crossed above zero), you may consider buying when r-squared crosses above the 0.27 level.

To determine if the trend is statistically significant for a given x-period linear regression line, plot the r-squared indicator and refer to the following table. This table shows the values of r-squared required for 95% confidence level at various time periods. If the

value is less than the critical values shown, you should assume that prices show no statistically significant trend.

Number of Periods	r-squared Critical Value (95% confidence)
5	0.77
10	0.40
14	0.27
20	0.20
25	0.16
30	0.13
50	0.08
60	0.06
120	0.03

You may even consider opening a short-term position opposite the prevailing trend when you observe the Slope rounding off at extreme levels. For example, if the Slope is at a relatively high level and begins to turn down, you may consider selling or opening a short position.

There are numerous ways to use the linear regression outputs of Slope and r-squared in trading systems. For more detailed coverage, refer to the book *The New Technical Trader* by Tushar Chande and Stanley Kroll (page 763).

Linear Regression Trendline

Linear regression is a statistical tool used to predict future values from past values. In the case of security prices, it is commonly used as a quantitative way to determine the underlying trend and when prices are overextended.

A Linear Regression trendline uses the least squares method to plot a straight line through prices so as to minimize the distances between the prices and the resulting trendline.

References:
- For plotting line studies in MetaStock, see page 186.
- For Linear Regression parameters, see page 342 and page 344.

Interpretation

If you had to guess what a particular security's price would be tomorrow, a logical guess would be "fairly close to today's price." If prices are trending up, a better guess might be "fairly close to today's price with an upward bias." Linear regression analysis is the statistical confirmation of these logical assumptions.

A Linear Regression trendline is simply a trendline drawn between two points using the least squares fit method. The trendline is displayed in the exact middle of the prices. If you think of this trendline as the “equilibrium” price, any move above or below the trendline indicates overzealous buyers or sellers.

A Linear Regression trendline shows where equilibrium exists. Raff Regression Channels (page 379) show the range prices can be expected to deviate from a Linear Regression trendline.

The Time Series Forecast indicator (page 400) displays the same information as a Linear Regression trendline. Any point along the Time Series Forecast is equal to the ending value of a Linear Regression Trendline plus its slope. For example, the ending value of a Linear Regression trendline (plus its slope) that covers 10 days will have the same value as a 10-day Time Series Forecast.

The Linear Regression trendline indicator is used to construct Raff Regression Channels (page 379), Projection Bands (page 374), Projection Oscillator (page 375) and the Linear Regression indicator (page 342).

MACD

The Moving Average Convergence/Divergence indicator (MACD) is calculated by subtracting the value of a 0.075 (26-period) exponential moving average from a 0.15 (12-period) exponential moving average. A 9-period dotted exponential moving average (the “signal line”) is automatically displayed on top of the MACD indicator line.

You may find the expert named “Equis - MACD” helpful in interpreting the MACD indicator.For more information on experts, see page 582.

References:
- For MetaStock plotting indicators, see page 237.
- For MACD parameters, see page 260.
- For Exponential Moving Average calculation, see page 352.

Interpretation

The basic MACD trading rule is to sell when the MACD falls below its 9-period signal line. Similarly, a buy signal occurs when the MACD rises above its signal line.

A variation of the MACD can be created using the following formula:

```
macd() - mov(macd(), 9, E)
```

Then change the indicator line style to a histogram (page 243), and plot a 9-period dotted moving average of the indicator.

In a system test of this indicator, sell arrows are drawn when the histogram peaked and turned down and buy arrows are drawn when the histogram formed a trough and turned up.

Tip:
- Additional variations on the MACD (e.g., different moving average time periods) can be created using the Price Oscillator indicator (page 371). An example custom indicator (page 290) shows how to calculate the MACD.

Market Facilitation Index

In his book, *Trading Chaos* (page 765), Dr. Bill Williams introduces a unique method of combining price action with volume. The main component of this method is a simple indicator he developed called the Market Facilitation Index (MFI).

The MFI simply divides the day's range (high to low) by the total volume. The result shows the efficiency of price movement by quantifying the price movement per unit of volume.

The "Profitunity" expert, written by Bill Williams, is included with MetaStock. This expert labels each bar on your chart and provides commentary on the current bar. For more information on the Expert Advisor, see page 581.

For information on other products and services offered by Bill Williams, call Profitunity Trading Group at 1-409-945-8880.

References:
- For MetaStock plotting indicators, see page 237.
- For MFI parameters, see page 260.

Interpretation

The MFI as a stand-alone indicator has little value. However, by comparing the current bar's MFI and volume with the previous bar's MFI and volume, a very tradable system emerges.

William's defines the four possible combinations of MFI and volume as follows. A plus sign means the current bar's value is greater than the previous bar's value. A minus sign means the current bar's value is less than the previous bar's value.

Volume	MFI	Label
+	+	Green
-	-	Fade
-	+	Fake
+	-	Squat

Green. This bar shows an increase in volume and MFI relative to the previous bar. Hence, there is price movement, and the MFI is larger for this bar than that for the previous bar. Further, more players are entering the market as signaled by the increase in volume. This activity in the futures market means that off-floor traders are very active. In addition, the price action is directional—that is, the market is moving in one direction due to the involvement of new traders putting on new positions. This is the kind of day that you would already want to have a trade on in the same direction.

Fade. This bar shows a decrease in volume and MFI relative to the previous bar. The market has slowed and there is a minor amount of activity as indicated by the low volume. This type of day is called a fade, as the traders' interest in the market by this point is fading. Often, this sort of day happens at the end of a trend. The market has simply reached a point where nobody is willing to establish any new positions. At this point the market appears to be suffering from a certain amount of boredom. Keep in mind, however, that out of this market condition, a new trend could emerge.

Fake. This bar shows a decrease in volume but an increase in the MFI. This condition means that the market is moving more relative to the previous bar (the greater MFI), but the lack of volume is evidence that there is no new participation. The price action may be driven by just the traders in the pit and is not attracting new players from the outside. Williams has an hypothesis, that the traders in the pit may be just strong enough to push the market to price levels where there are many stop orders resting in the hands of the brokers, hence faking out the off-floor traders.

Squat. This bar shows an increase in volume relative to the previous bar, but the MFI is lower. The increase in volume indicates heavy activity, but the decrease in the MFI indicates that the market is unable to make any real headway. Volume increased, the trend has stalled and the price movement has stopped. This price action usually, but not always occurs prior to an important move in the opposite direction. This type of bar is called a squat bar because the market appears to be squatting prior to a breakout. Often, the breakout of such a bar will indicate whether this squat is a trend reversal squat or a trend continuation squat.

Mass Index

The Mass Index, popularized by Tushar Chande and Donald Dorsey (see the June 1992 issue of *Technical Analysis of Stocks & Commodities* magazine), is calculated by summing an exponentially smoothed moving average of the daily ranges (High-Low) over 25 periods.

The Mass Index is designed to identify reversals in trend by measuring the narrowing and widening of the average range between the high and low prices. As the range widens, the Mass Index increases. As the range narrows, the Mass Index decreases.

References:
- For MetaStock plotting indicators, see page 237.
- For Mass Index parameters, see page 261.

Interpretation

The most significant pattern to watch for is called the "reversal bulge." A reversal bulge occurs when a 25 period Mass Index rises above 27 and subsequently falls below 26.5. A reversal in price is likely once the Mass Index falls below 26.5. The overall direction of prices (i.e., trending or trading range), is unimportant.

A 9-period exponential moving average is used to determine whether the reversal bulge indicates a "buy" or "sell" signal. Since the Mass Index attempts to predict reversals in trend, positions should be taken by buying if the moving average is trending down and selling if the moving average is trending up. Since trends can fail to reverse, stop-loss orders should be placed with new positions.

Median Price

The Median Price indicator is calculated by adding the high price and the low price together, and then dividing by two. The *result* is the average, or median, price.

$$\text{Median Price} = \frac{\text{High} + \text{Low}}{2}$$

References:
- For Plotting indicators, see page 237.
- For Median Price parameters, see page 261.

Interpretation

The Median Price indicator provides a simple, single-line chart of the day's average price. You may find it helpful when testing moving average penetration systems to display moving averages of the Median Price indicator, rather than of the security's closing price.

Tip:
- An example custom indicator (page 290) shows how to calculate the Median Price indicator.

MESA Sine Wave

The MESA Sine Wave indicator was developed by recognized cycle specialist John Ehlers. It was introduced in the November 1996 issue of *Technical Analysis of Stocks & Commodities* magazine.

The MESA Sine Wave indicator looks like a sinewave when the market is in a cycle mode and tends to wander when the market is in a trend mode. The MESA Sine Wave indicator anticipates cycle mode turning points rather than waiting for confirmation as is done with most oscillators. The MESA Sine Wave indicator has the additional advantage that trend mode whipsaw signals are minimized.

References:
- For plotting MetaStock indicators, see page 237.
- For MESA Sine Wave indicator parameters, see page 261.

Interpretation

The MESA Sine Wave indicator consists of two plots - one displaying the Sine of the measured phase angle over the time period parameter and the other the Sine of the phase angle advanced by 45 degrees (called the Lead Sine). Together, the crossings of the Sine and Lead Sine plots give clear advanced indication of cycle mode turning points.

When the MESA Sine Wave indicator resembles an actual sine wave, this suggests the market is in a cycle mode. The indicator lines are not well structured when the market is in a trend mode. A buy signal is given when the Sine plot crosses above the Lead Sine plot. A sell signal is given when the Sine plot crosses below the Lead Sine plot. An obvious advantage that the MESA Sine Wave indicator has over its “overbought/oversold” counterparts is that it enters and exits much more precisely without giving up a piece of the market’s movement by waiting for confirmation.

When the market is in a trend mode the MESA Sine Wave indicator does not resemble a sine wave. In fact, the Sine and Lead Sine plots typically languish in a sideways pattern around zero, running somewhat parallel and distant from each other. The correct trading strategy in the trend mode is to trade the trend. Basic moving average crossovers are helpful for entering and exiting positions in this type of market.

The MESA Sine Wave indicator is sensitive to using the correct time period parameter. You can use the Cycle Lines line study (page 196) to estimate the best time period to use.

Momentum

The momentum of a security is the ratio of today's price compared to the price *x*-time periods ago. The formula equivalent of the calculation is shown below:

$$\text{Momentum} = \frac{\text{Close}}{\text{ref(Close,}-10)} \cdot 100$$

Where: ref(Close,-10) = The closing price 10 periods ago

References:
- For MetaStock plotting indicators, see page 237.
- For Momentum parameters, see page 261.

Interpretation

The interpretation of the Momentum indicator is identical to the interpretation of the Price R.O.C (page 371). Both indicators display the rate-of-change of a security's price. The Price R.O.C. indicator displays the rate-of-change as a percentage. The Momentum indicator displays the rate-of-change as a ratio.

Money Flow Index

The Money Flow Index (MFI) attempts to measure the strength of money flowing in and out of a security. It is closely related to the Relative Strength Index (RSI); however, the Money Flow Index accounts for volume action. The RSI incorporates price action only.

Money flow (not the Money Flow Index) is calculated by determining the average price for the day and then comparing this figure to the previous day's average price. If today's average price is greater, it is considered positive money flow. If today's average price is less, it is considered negative money flow. **Money flow** for a specific day is calculated by multiplying the average price by the volume.

$$\text{Money Flow} = \text{Volume} \cdot \text{Average Price}$$

Positive Money Flow is the sum of the positive money flow over the specified number of periods. Negative Money Flow is the sum of the negative money flow over the specified number of periods.

$$\text{Money Ratio} = \frac{\text{Positive Money Flow}}{\text{Negative Money Flow}}$$

Finally, the **Money Flow Index** is calculated using the following formula:

$$\text{Money Flow Index (MFI)} = 100 - \frac{100}{1 + \text{Money Ratio}}$$

References:
- For MetaStock plotting indicators, see page 237.

- For Money Flow Index parameters, see page 262.

Interpretation

The interpretation of the Money Flow Index is as follows:

- Look for divergence/failure swings between the indicator and the price action. If the price trends higher (lower) and the MFI trends lower (higher), then a reversal may be imminent.
- Look for market tops to occur when the MFI is above a specific level (e.g., 80). Look for market bottoms to occur when the MFI is below a specific level (e.g., 20).

Moving Averages

A moving average is a method of calculating the average value of a security's price, or indicator, over a period of time. The term "moving" implies, and rightly so, that the average changes or moves. When calculating a moving average, a mathematical analysis of the security's average value over a predetermined time period is made. As the security's price changes over time, its average price moves up or down.

MetaStock calculates and displays six different types of moving averages: simple (also referred to as arithmetic), exponential, time series, triangular, variable, and weighted. In addition, MetaStock will calculate moving averages of the security's open, high, low, close, median price, typical price, volume, open interest, or indicator.

The only significant difference between the various types of moving averages is the weight assigned to the most recent data. Once this "weighting" scheme has been determined, it is held static over the range of calculations. The exceptions are the variable moving average and volume adjusted moving average. The variable moving average automatically adjusts its weighting based on market conditions. A variable moving average becomes more sensitive to recent data as volatility increases and less sensitive to recent data as volatility decreases. Similarly, the volume adjusted moving average automatically adjusts as the security's *volume* increases and decreases.

References:
- For MetaStock plotting indicators, see page 237.
- For Moving Average parameters, see page 262.

Exponential

An exponential (or exponentially weighted) moving average is calculated by applying a percentage of today's closing price to yesterday's moving average value.

For example, to calculate a 9% exponential moving average of IBM: First, we would take today's closing price and multiply it by 9%. We would then add this product to the value of yesterday's moving average multiplied by 91% (100% - 9% = 91%).

$$MA = (\text{Today's close} \cdot 0.09) + (\text{Yesterday's MA} \cdot 0.91)$$

Because most investors feel more comfortable working with time periods rather than with percentages, MetaStock converts days into an exponential percentage. For example, if a 21-day exponential moving average is requested, a 9% moving average is calculated. The formula for converting days to exponential percentages is as follows:

$$\text{exponential percentage} = \frac{2}{\text{time periods} + 1}$$

For example, to calculate a 10-day exponential moving average, you would use 0.18:

$$0.18 = \frac{2}{10 + 1}$$

To convert an exponential percentage into time periods, you would use the following formula:

$$\text{time periods} = \frac{2}{\text{percentage}} - 1$$

Using our previous example, we can check to see that a 0.18 exponential moving average is actually a 10-day average.

$$10 = \frac{2}{0.18} - 1$$

The method used to calculate an exponential moving average puts more weight toward recent data and less weight toward past data than does the simple moving average method. This method is often called exponentially weighted.

Simple

A simple, or arithmetic, moving average is calculated by adding the closing price of the security for a number of time periods (e.g., 12 days) and then dividing this total by the number of time periods. The result is the average price of the security over the time period.

For example, to calculate a 21-day moving average of IBM: First, we would add up IBM's closing prices for the preceding 21 days. Next, we would divide that sum by 21; this would give us the average price of IBM over the preceding 21 days. We would plot this average price on the chart. The following day (tomorrow) we would do the same calculations: add up the previous 21 days' closing prices, divide by 21, and plot the resulting figure on the chart.

Time Series

The time series moving average is calculated using linear regression techniques. Rather than plotting a straight linear regression line, a time series moving average plots the last point of the line. It does this using the specified number of periods for each day. The individual points are then connected together with a line to form a time series moving average.

This moving average is sometimes referred to as a "moving linear regression" study or a "regression oscillator."

For information on calculating linear regression using the least squares method (the basis behind time series moving averages), refer to any basic statistics book.

Triangular

A triangular moving average is similar to exponential and weighted moving averages except a different weighting scheme is used.

Exponential and weighted moving averages assign the majority of the weight to the most recent data. Simple moving averages assign the weight equally across all the data. With a triangular moving average, the majority of the weight is assigned to the middle portion of the data.

A triangular moving average is simply a double-smoothed simple moving average.

To calculate a 9-period (similar for all odd periods) triangular moving average:

1. Divide 9 by 2 to get 4.5
2. Round 4.5 up to 5
3. The triangular moving average is:
   `(odd periods) = (mov(mov(c,5,s)5,s)`

A 12-period (similar for all even periods) is calculated as follows:

1. Divide 12 by 2 to get 6.
2. Add 1 to 6 to get 7*.
3. The triangular moving average is:

```
(even periods) = (mov(mov(c,6,s),7,s)
```

Variable

A variable moving average is an exponential moving average that automatically adjusts the smoothing constant based on the volatility of the data series. The more volatile the data, the larger the smoothing constant used in the moving average calculation. The larger the smoothing constant, the more weight is given to the current data. The opposite is true for less volatile data.

Traders often associate high volatility with strongly trending markets. However, this is a mistake. Strong trending markets are often less volatile because of the consistency of day-to-day price changes. Its when prices are erratic in their day-to-day movements (i.e., down a lot, up a little, up a little, up a lot, up a little, down a little, etc.), that volatility increases. This can occur in uptrending, downtrending, or sideways markets.

Typical moving averages suffer from the inability to compensate for changes in volatility. During volatile markets, you want a moving average to increase its sensitivity, so that you will quickly be on the correct side of any wild gyrations. By automatically adjusting the smoothing constant, a variable moving average is able to adjust its sensitivity, allowing it to perform better in both high and low volatility markets.

```
VMA = (0.78*(volatility index) * close) +
(1-0.078 * volatility index)*yesterday's VMA
```

The absolute value of a 9-period Chande Momentum Oscillator is used for the volatility index. The higher this index the more volatile the market, thereby increasing the sensitivity of the moving average.

This method of calculating a variable moving average was presented by Tushar Chande in the March 1992 issue of *Technical Analysis of Stocks & Commodities* magazine.

*. The rule is to take the length divided by 2 as one average, and that number plus 1 as the second.

Volume Adjusted

Dick Arms, well-known as the developer of the Arms Index and the equivolume charting method (page 328), has developed a unique method for calculating moving averages. In keeping with his prior work, the calculation method incorporates volume and is appropriately called a *volume adjusted moving average*.

The calculation for a volume adjusted moving average is somewhat complex; however, it is conceptually easy to understand. All moving averages (even volume adjusted) use some type of weighting scheme to "average" the data. Exponential and weighted moving averages assign the majority of weight to the most recent data. Simple moving averages assign the weight equally across all data. Variable moving averages assign the majority of the weight to the most volatile data. And as its name implies, volume adjusted moving averages assign the majority of weight to the day's with the most volume.

A volume adjusted moving average is calculated as follows:

- Calculate the average volume using every time period in the chart.
- Calculate the volume increment by multiplying the average volume by 0.67.
- Calculate each period's volume ratio by dividing each period's actual volume by the volume increment.
- Starting at the most recent time period and working backwards, multiply each period's price by the period's volume ratio and cumulatively sum these values until the user-specified number of volume increments is reached. Note that only a fraction of the last period's volume will likely be used.

Weighted

A weighted moving average is also designed to put more weight on recent data and less weight on past data. A weighted moving average is calculated by multiplying each of the previous day's data by a weight. The following table shows how a 5-day weighted moving average is calculated.

Day No.	Weight	* Price	= Weighted Price
1	1	25	25
2	2	26	52
3	3	28	84
4	4	25	100
5	5	29	145
Totals	15	133	= 27.067

Notice how the 5-day weighted moving average gives five times more weight to today's price (i.e., ***5*** * 29) than to the price five days ago (i.e., ***1**** 25).

Interpretation

The most popular method of interpreting a moving average is to compare the relationship between a moving average of the security's closing price and the security's closing price itself. A sell signal is generated when the security's price falls below its moving average and a buy signal is generated when the security's price rises above its moving average.

This type of moving average trading system is not intended to get you in at the exact bottom and out at the exact top. Rather, it is designed to keep you in line with the security's price trend by buying shortly after the security's price bottoms and selling shortly after it tops.

The critical element in a moving average is the number of time periods used in calculating the average. When using hindsight, you can always find a moving average that would have been profitable. The key is to find a moving average that will be consistently profitable. The most popular moving average is the 39-week (or 200-day) moving average. This moving average has a good track record in timing the major (long- term) market cycles. The length of a moving average should fit the market cycle you wish to follow:

Trend	Moving Average Length
Very Short Term	5-13 days
Short Term	14-25 days
Minor Intermediate	26-49 days
Intermediate	50-100 days
Long Term	100-200 days

When you display moving averages, the number of time periods you enter is based on the periodicity of the security that is loaded. For example, if you load daily data, then entering 12 for the number of time periods in the moving average will cause MetaStock to calculate a 12-day moving average. If you had loaded weekly data, MetaStock would calculate a 12-week moving average.

You can convert a daily moving average quantity into a weekly moving average quantity by dividing the number of days by 5 (e.g., a 200-day moving average is almost identical to a 40-week moving average). To convert a daily moving average quantity into a monthly quantity, divide the number of days by 21 (e.g., a 200-day moving average is very similar to a 9-month moving average).

MetaStock enables you to plot moving averages of securities and any of the indicators tracked by the program. The interpretation of an indicator's moving average is similar to the interpretation of a security's moving average: when the indicator rises above its moving average, it signifies a continued upward movement by the indicator; when the indicator falls below its moving average, it signifies a continued downward movement by the indicator.

Indicators which are especially well-suited for use with moving average penetration systems include the MACD, Price R.O.C., Momentum, and Stochastics.

Some indicators, such as short-term Stochastics, fluctuate so erratically that it is difficult to tell what their trend really is. By removing the indicator (i.e., setting the Indicator Style to Invisible in the Indicator's Properties dialog) and then plotting a moving average of the indicator, we can see the general trend of the indicator rather than its day-to-day fluctuations.

Whipsaws can be reduced, at the expense of a slightly later signal, by plotting a short-term moving average (e.g., 2-10 day) of oscillating indicators such as the 12-day R.O.C., Stochastics, or the RSI. For example, rather than selling when the Stochastic Oscillator falls below 80, you might sell only when a 5-period moving average of the Stochastic Oscillator falls below 80.

Negative Volume Index

The Negative Volume Index (NVI) relates a decrease in volume to the change in the security's price. When volume decreases from the previous day, the NVI is adjusted by the percentage change in the security's price.

```
If (V < (ref(V,-1)) then
NVI = I + (((C - ref(C,-1) / ref(C,-1)))

If (V >= ref(V,-1)) then NVI = I
```

Where:

`C`	=	Today's closing price
`ref(C,-1)`	=	Yesterday's closing price
`I`	=	Yesterday's Negative Volume Index
`NVI`	=	Today's Negative Volume Index
`V`	=	Today's volume
`ref(V,-1)`	=	Yesterday's volume

The NVI is constructed so it only displays changes on days when volume decreases from the previous day. Because falling prices are usually associated with falling volume, the NVI will usually trend downward.

References:
- For MetaStock plotting indicators, see page 237.
- For NVI parameters, see page 263.
- For NVI function, see page 459.
- NVI interpretation is the opposite of the PVI; see page 369.

Interpretation

Interpretation of the NVI assumes that on days when volume increases, the crowd-following "uninformed" investors are in the market. Conversely, on days with decreased volume, the "smart money" is quietly taking positions. Thus, changes shown in the NVI (remember that the NVI changes only on *lower* volume days) display what the smart money is doing.

Stock Market Logic, by Norman Fosback (page 763), points out that the odds of a bull market are 95 out of 100 when the NVI of the Dow Industrials is above its one-year moving average.

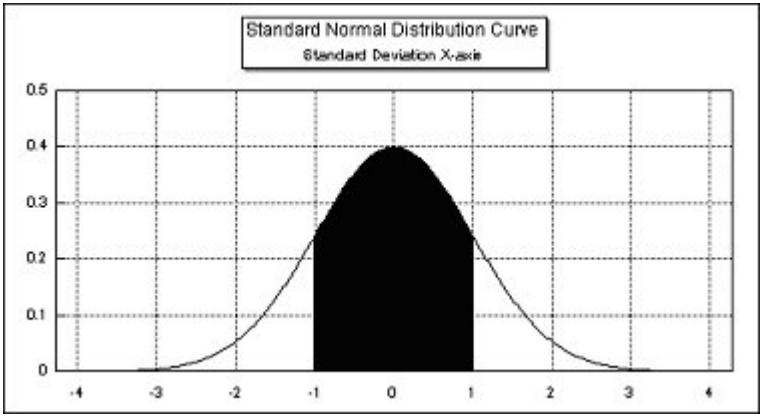
Tip:
- An example custom indicator (page 290) shows how to calculate the Negative Volume Index.

ODDS Probability Cones

ODDS™ Probability Cones were developed by Don Fishback, renowned option expert and originator of the ODDS option trading methodology. Perhaps Mr. Fishback's most significant contribution to option analysis includes the application of price volatility and its affect on the laws of probability. ODDS Probability Cones are a result of this work.

Fishback's ODDS methodology is based on the assumptions made in every commonly used option pricing model. If you use an option pricing model to value options, you are making the probability assumptions used by ODDS, whether you realize it or not.

The assumption is that the financial markets are random and that prices exhibit a normal distribution. That means that if you looked at the market's price changes over an extended period of time, the shape of the price distribution would look like a bell curve. The x-axis of a bell curve is in terms of standard deviations— the y-axis in terms of price. A normal distribution assumption has some very useful properties, including the one that is the most important to us— probability is equal to the area under the curve.



The official definition of volatility is equal to one standard deviation of the price change (expressed in logarithmic terms) annualized. In simpler language, volatility provides us with a value that can be used to measure the "likelihood" of a significant price change. The higher the volatility, the greater the likelihood of a significant price move.

Notice that volatility is equal to one standard deviation, which happens to be the same unit as our bell curve's x-axis. It is this property that allows us to create the ODDS Probability Cones found in MetaStock.

References:

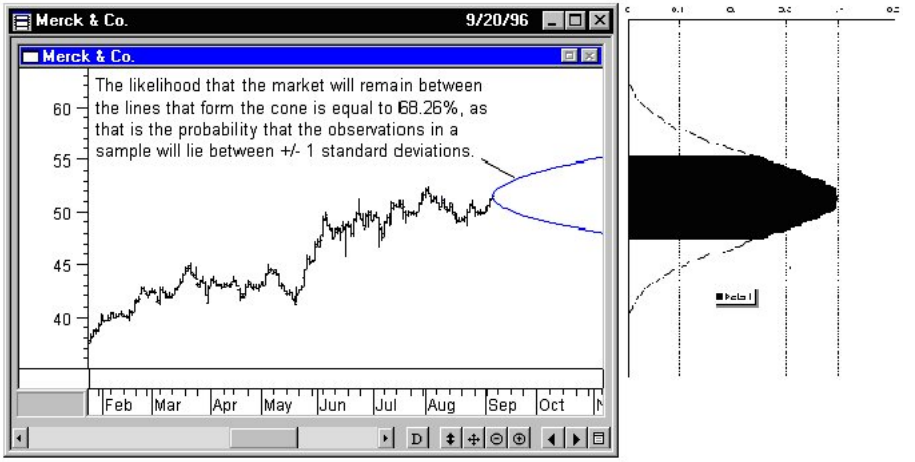
- For plotting line studies in MetaStock, see page 185.
- Option traders may find the expert named “Don Fishback – ODDS™ Option Analyst” helpful. For more information on experts, see page 582.
- For ODDS Probability Cones parameters, see page 216.
- For more information, contact Don Fishback at 1-800-637-8970.

Interpretation

ODDS Probability Cones (which are greatly influenced by recent price volatility) provide you with a visual guide to the most probable range of future prices. This range (i.e. the cone’s width) is determined by recent volatility in prices, the number of time periods projected, and the probability percentage (e.g., 68% confidence, 90% confidence, etc.). The more volatile the security prices, the wider the expected range of future prices and hence the wider the cones. The cones always widen from the apex even if recent volatility is very low, because as time increases, the better the odds of a significant price move.

By default, the cones show the expected range of prices given a 68.26% probability (this is equivalent to one standard deviation). This means that there is a 68.26% probability that prices will remain within the cones over the specified time frame. By increasing this percentage, you can control the width of the cones. As you might expect, higher percentages result in wider cones.

The following illustration shows a chart and a standard bell curve (with one standard deviation shaded) flipped on its side. Note that this corresponds to the width of the Probability Cones on the chart (which are plotted using 68.26%, or one standard deviation).



The original use of this type of analysis was intended to help option traders determine the best strategy to implement. From a probability standpoint, an option trader would prefer to sell options with strikes that lie outside the cones and buy options with strikes that lie within the cones.

The cones also have equal value for the analysis of regular long and short positions. All else being equal and assuming you are confident in your price directional forecast, you would prefer to establish a long or short position in a security with wide cones rather than one with narrow cones. Of course, this assumes that the recent calculated volatility will continue or rise. If you expect volatility to drop, then you should reconsider.

On Balance Volume

On Balance Volume relates volume to price change. It is calculated by adding the day's volume to a cumulative total when the security's price closes up, and subtracting the day's volume when the security's price closes down.

```
If today's close > yesterday's close then
 OBV = yesterday's OBV + today's volume

If today's close < yesterday's close then
 OBV = yesterday's OBV - today's volume

If today's close = yesterday's close then
 OBV = yesterday's OBV
```

References:
- For MetaStock plotting indicators, see page 237.
- For OBV parameters, see page 263.

Interpretation

On Balance Volume is a running total of volume. It seeks to show if volume is flowing into or out of a security. When the security closes higher than the previous close, all of the day's volume is considered up-volume. When the security closes lower than the previous close, all of the day's volume is considered down-volume.

Joe Granville is the father of OBV and its analysis. We can barely begin to explain a simplified version of OBV interpretation here. If you want further information on OBV analysis, we recommend that you read his book, *New Strategy of Daily Stock Market Timing for Maximum Profits* (page 764).

The basic assumption, regarding OBV analysis, is that OBV changes precede price changes. The theory is that smart money can be seen flowing into the security by a rising OBV. When the public then

moves into the security, both the security *and* the OBV will surge ahead. If the security's price movement precedes OBV movement, a "non-confirmation" is said to have occurred. Non-confirmations can occur at bull market tops (when the security rises without, or before, the OBV) or at bear market bottoms (when the security falls without, or before, the OBV).

The OBV is said to be in a rising trend when each new peak is higher than the previous peak and each new trough is higher than the previous trough. Likewise, the OBV is in a falling trend when each successive peak is lower than the previous peak and each successive trough is lower than the previous trough. When the OBV is moving sideways and is not making successive highs and lows, it is in a doubtful trend. Once a trend is established, it remains in force until it is broken. There are two ways in which the OBV trend can be broken. The first occurs when the trend changes from a rising trend to a falling trend, or from a falling trend to a rising trend.

The second way the OBV trend can be broken is if the trend changes to a doubtful trend and remains doubtful for more than three days. Thus, if the security changes from a rising trend to a doubtful trend and remains doubtful for only two days before changing back to a rising trend, the OBV is considered to have always been in a rising trend.

When the OBV changes to a rising or falling trend, a *breakout* is said to have occurred. Since OBV breakouts normally precede security breakouts, investors should buy long on OBV upside breakouts. Likewise, investors should sell short when the OBV makes a downside breakout. Positions should be held until the trend changes (as explained in the preceding paragraph). This method of analyzing On Balance Volume is designed for trading short-term cycles. According to Granville, investors must act quickly and decisively if they wish to profit from short-term OBV analysis.

Tip:
- An example custom indicator (page 290) shows how to calculate On Balance Volume.

Open Interest

The Open Interest indicator plots the number of open contracts of a given commodity.

Open interest is only available for futures and can only be plotted if the data file contains open interest data. A simple way to tell if the file contains open interest data is to select the Open Interest indicator. If nothing is plotted, there is no open interest data.

References:
- For MetaStock plotting indicators, see page 237.
- For Open Interest parameters, see page 263.

Interpretation

Open interest is used to measure the activity and strength of a commodity. An increase in open interest accompanied with higher prices shows that new buyers are continuing to enter the market and thus can be viewed as a confirmation of the upward price move. Likewise, a decrease in open interest while prices are making new highs (a divergence) is often viewed as a warning sign suggesting an impending decline in prices.

Option Indicators

A brief interpretation of the option indicators in MetaStock is provided below.

References:
- For indicators and option analysis, see page 762.
- For MetaStock plotting indicators, see page 237.
- For Option indicator parameters, see page 264.

Option Delta

Delta shows the amount that the option's price will change if the underlying security's price changes by $1.00.

For example, if XYZ is selling for $105.00/share, a call option on XYZ is selling for $2.00 and the Delta is 75%, then the option's price should increase $0.75 (to $2.75) if the price of XYZ increases to $106.00/share. In other words, the option should go up $0.75 for each $1.00 that XYZ goes up. For information on the delta function in the MetaStock Programming language, see page 442.

Option Expiration

The Option Expiration indicator shows the month to month expiration cycle of stock and index options. It is designed primarily to help in the development of more robust trading systems using the indicator's function. (For more information on the Option Expiration function, see page 459). The visual interpretation of the plot itself is of little value as it simply shows the number of days until the next monthly option expiration date.

Stock and Index options expire on the Saturday following the third Friday of each month. Options may be written for one of three cycles. New options can be written every three months, with cycles beginning in January, February, and March.

The option expiration day in the months of March, June, September, and December are referred to as "triple witching." On these days, stock options, index options, and index futures all expire simultaneously. For this reason, triple witching days are often very volatile.

Since options officially expire on Saturdays (a non-trading day), the Next Option Expiration indicator's value on the Friday before expiration will be 1.00—meaning one day until expiration. This is also consistent with the way the Option Life function calculates (page 460).

Some of the most active days in the history of the markets have occurred at option expiration. Because of the increasing use of options by both small and large investors as a means of hedging and speculating, it may be wise to consider the potential increase in volatility that can occur in the underlying security on option expiration days.

References:

- For MetaStock plotting indicators, see page 237.
- For Option Expiration parameters, see page 264.

Option Gamma

Gamma shows the anticipated change in Delta, given a one point increase in the underlying security. Thus, it shows how responsive Delta is to a change in the underlying security's price. For example, a Gamma of four indicates that the Delta will increase four points (e.g., from 50% to 54%) for each one point increase in the underlying security's price. For information on the Gamma function in the MetaStock Programming Language, see page 447.

Option Life

Option Life shows the number of days until expiration. Generally speaking, the longer the time until expiration, the more valuable the option. For information on the Life function in the MetaStock Programming Language, see page 460.

Option Price

The Option Price is the main output of the Black-Scholes model. It shows how much the option should sell for based on the various components that make up the model (e.g., volatility, option life, security price, etc.). It helps answer the question, “Is the option overpriced or underpriced?”

Option Theta

Theta shows the change in the option’s price (in points) due to the effect of time alone. The longer the time until expiration, the less effect that time has on the price of the option. However, as the option nears expiration, the effect can be great, particularly on out-of-the-money options. Theta is also referred to as “time decay.” For information on the Theta function in the MetaStock Programming Language, see page 470.

Option Vega

Vega shows the change in the option price due to an assumed 1% increase in the underlying security’s volatility. Vega shows the dollar amount of gain that should be expected if the volatility goes up one point (all else being equal).For information on the Vega function in the MetaStock Programming Language, see page 473.

Option Volatility

Options of high volatility stocks are worth more than those with low volatility, because of the greater chance the option has of moving in-the-money by expiration. Option purchasers should prefer options with high volatilities and option writers should prefer options with low volatilities (all else being equal). This measure of option volatility is a historical volatility measurement requiring 21 days of data. It is based on the “High-Low-Close Estimator” method presented in the book, *The Complete Investment Book* (page 763).

Parabolic SAR

The Parabolic Time/Price System, developed by J. Welles Wilder, is explained thoroughly in his book, *New Concepts in Technical Trading Systems* (page 765). This indicator is used to set price stops and is often called the stop-and-reversal (SAR) indicator.

References:
- For MetaStock plotting indicators, see page 237.
- For Parabolic SAR parameters, see page 265.

Interpretation

If you are long (i.e., the price is above the SAR), the SAR will move up every day, regardless of the direction the price is moving. The amount the SAR moves up depends on the amount that prices move.

The Parabolic SAR provides excellent stops. You should close long positions when the price falls below the SAR and close short positions when the price rises above the SAR.

The Parabolic SAR is plotted as shown in Wilder's book (above). Each SAR stop level point is displayed on the day in which it is in effect. Note that the SAR value is today's, not tomorrow's stop level.

Performance

The Performance indicator displays a security's price performance as a percentage. This is sometimes called a "normalized" chart.

References:
- For MetaStock plotting indicators, see page 237.
- For Performance parameters, see page 265.

Interpretation

The numeric value of the Performance indicator is the percentage that the security has changed since the first period loaded. For example, a value of 10 would mean that the security's price has increased 10% since the first period loaded on the left side of the chart. Similarly, a value of -10% would mean that the security's price has fallen by 10% since the first period.

Tip:
- The Performance indicator calculates the percent that prices have changed since the first day loaded in the chart. Therefore, if you want to calculate a security's performance from a specific date (e.g., the day you bought it), you should first use the X-Axis Properties dialog (page 119) to change the first date loaded.

Point and Figure

Point and Figure (P&F) charts differ from “normal” price charts in that they completely disregard the passage of time and only chart changes in prices. Rather than having price on the y-axis and time on the x-axis, P&F charts display price changes on both axes.

P&F charts display an “X” when prices rise by the “box size” and display an “O” when prices fall by the box size. Note that no Xs or Os are drawn if prices rise or fall by an amount that is less than the box size. Each column can contain either Xs or Os, but never both. In order to change columns (e.g., from an X column to an O column), prices must reverse by the “reversal amount” multiplied by the box size. For example, if the box size is 3 points and the reversal amount is 2 boxes, then prices must reverse direction 6 points (3 times 2) in order to change columns. If you are in a column of Xs, the price must fall 6 points in order to change to a column of Os. If you are in a column of Os, the price must rise 6 points in order to change to a column of Xs. The changing of columns signifies a change in the trend of prices. Because prices must reverse direction by the reversal amount, each column in a P&F chart will have at least “reversal amount” boxes.

When in a column of Xs or Os, MetaStock will first check to see if prices have moved in the current direction (e.g., rose if in a column of Xs or fell if in a column of Os) before checking for a reversal. MetaStock uses the high and low prices to decide if prices have changed enough to display a new box. Indicators calculated on P&F charts use all the data in each column and then display the average value of the indicator for that column.

Interpretation

P&F charts are designed to display the underlying supply and demand of a security. A column of Xs shows that demand is exceeding supply (a rally); a column of Os shows that supply is exceeding demand (a decline); and a series of short columns shows that supply and demand are relatively equal.

There are several chart patterns that appear repeatedly in P&F charts. These include Double Tops and Bottoms, Bullish and Bearish Signal formations, Bullish and Bearish Symmetrical Triangles, Triple Tops and Bottoms, etc.

Note: It is beyond the scope of the manual to fully explain all of the possibilities. For a list of recommended books, see page 763.

Polarized Fractal Efficiency

The Polarized Fractal Efficiency indicator (PFE) was developed by Hans Hannula. It was introduced in the January 1994 issue of *Technical Analysis of Stocks & Commodities* magazine.
As an engineer, programmer, and trader with over 30 years market experience, Mr. Hannula developed a unique approach to applying the laws of fractal geometry and chaos to the markets.

References:
- For MetaStock plotting indicators, see page 237.
- For Polarized Fractal Efficiency parameters, see page 265.

Interpretation

Drawing upon the pioneering works of mathematician Benoit Mendelbrot, Mr. Hannula developed an indicator to gauge the efficiency that prices travel between two points in time.

The more linear and efficient price movement, the shorter the distance the prices must travel between two points. The more "squiggly" the price movement, the less efficient its travel.

The primary use of the PFE indicator is as a measure of how trendy or congested price action is. PFE readings above zero mean that the trend is up. The higher the reading the "trendier" and more efficient the upward movement. PFE readings below zero mean that the trend is down. The lower the reading the "trendier" and more efficient the downward movement. Readings around zero indicate choppy, less efficient movement, with a balance between the forces of supply and demand.

Several interesting phenomenon have been observed by Mr. Hannula:

- Indexes (particularly the OEX) tend to have a maximum PFE (both plus and minus) of about 43%.
- The middle region (around zero) is a balance between supply and demand and therefore a congestion point.
- A hooking pattern often occurs right before the end of an efficient period. This pattern occurs when the PFE appears to have maxed out, turns in the opposite direction towards zero, and then makes one last attempt at maximum efficiency. Trades can be entered in the opposite direction, with a stop just beyond the extreme of the hook. Stay with the trade all the way to the other extreme, unless it slows around the zero line. If it slows around zero, exit the trade and wait for a new maximum efficiency entry.

Positive Volume Index

The Positive Volume Index (PVI) relates an increase in volume to the change in the security's price. When volume increases from the previous day, the PVI is adjusted by the percentage change in the security's price.

```
If (V > ref(V,-1)) then
PVI = I + (((C - ref(C,-1)) / ref(C,-1)))
If (V <= ref(V,-1)) then PVI = I
```

Where:

`C`	=	Today's closing price
`ref(C,-1)`	=	Yesterday's closing price
`I`	=	Yesterday's Positive Volume Index
`NVI`	=	Today's Positive Volume Index
`V`	=	Today's volume
`ref(V,-1)`	=	Yesterday's volume

The PVI is constructed so it only displays changes on days when volume increases from the previous day. Because rising prices are usually associated with rising volume, the PVI will generally trend upward.

References:
- For MetaStock plotting indicators, see page 237.
- For PVI parameters, see page 292.

Interpretation

The interpretation of the PVI is the opposite of the NVI (page 358). The PVI seeks to show what "uninformed" investors are doing.

Tip:
- An example custom indicator (page 290) shows how to calculate the Positive Volume Index.

Price Channel

Price Channels are similar in concept to other types of bands and channels including moving average bands, Projection Bands (page 374), Envelopes (page 327), and Bollinger Bands (page 310). They also have some of the characteristics of channel lines such as Raff Regression Channels (page 379).

Price Channels are plotted by finding the highest high over the specified number of periods and plotting the result *above* the current price to form the top channel. The bottom channel is formed by plotting the lowest low over the specified number of periods. The resulting plot consists of two lines representing the recent highest and lowest prices. Price Channels, in essence, are dynamic (or moving) support and resistance levels based. They are constantly adjusted to reflect recent new highs and new lows.

References

- For plotting line studies in MetaStock, see page 185.
- For Price Channel parameters, see page 266.

Interpretation

Price Channels are used much like other types of channels and bands— they help gauge the ebb and flow of optimism and pessimism. When prices are at or near the upper channel, extreme optimism is indicated— look for prices to meet resistance and to move down to more rational levels. Likewise, when prices are at or near the lower channel, extreme pessimism is indicated— look for prices to find support and move up to more rational levels.

Since Price Channels are calculated from absolute high and low price levels, they tend to provide traditional support and resistance. For example, if prices bounce two or more times off of the bottom channel near the same price level, strong support is indicated. Likewise, if prices rebound two or more times off the top channel near the same price level, strong resistance is indicated.

Interestingly, much like Bollinger Bands, narrow Price Channels often precede significant price moves. Several interesting observations involving the combination of a 20-period Bollinger Band and 20-period Price Channel are noted below:

- Expect a significant upward price move when the Price Channel and Bollinger Bands are very narrow and the closing price exceeds the upper Price Channel. Place a protective stop just below the middle Bollinger Band.
- Expect a significant downward price move when the Price Channel and Bollinger Bands are very narrow and the closing price drops below the lower Price Channel. Place a protective stop just above the middle Bollinger Band.

- Expect a short-term pullback against the prevailing uptrend when the Price Channel and Bollinger Bands are wide and the closing price exceeds the upper Price Channel.
- Expect a short-term pullback against the prevailing downtrend when the Price Channel and Bollinger Bands are wide and the closing price exceeds the lower Price Channel.

Price Oscillator

The Price Oscillator displays the difference between two moving averages of the security's price. The difference between the averages can be expressed in either points or percentages.

References:
- For MetaStock plotting indicators, see page 237.
- For Price Oscillator parameters, see page 266.

Interpretation

Moving average analysis often generates buy signals when a short-term moving average (or the security's price) rises above a longer-term moving average. Conversely, sell signals are generated when a shorter-term moving average falls below a longer-term moving average. The Price Oscillator illustrates the cyclical (and often profitable) signals generated by one or two moving average systems.

Tips:
- For more information on moving average systems and oscillators, refer to Moving Averages (page 351) and the MACD (page 345).
- An example custom indicator (page 290) shows how to calculate the Price Oscillator.

Price Rate-Of-Change

The Price Rate-Of-Change (R.O.C.) indicator (percent method) is calculated by dividing the price change over the last x-periods by the closing price of the security x-periods ago. The result is the percentage that the security's price has changed in the last x-periods.

If the security's price is higher today than x-periods ago, the R.O.C. will be a positive number. If the security's price is lower today than x-periods ago, the R.O.C. will be a negative number.

References:
- For MetaStock plotting indicators, see page 237.
- For Price R.O.C. parameters, see page 267.

Interpretation

A long recognized phenomenon of security prices is the fact that prices tend to surge ahead and retract in a cyclical wave-like motion. The Price Rate-Of-Change indicator illustrates this wave-like motion of a security's price in an oscillator format. As the security's price increases, its R.O.C. will rise; conversely, as its price falls, its R.O.C. will fall. The faster prices rise or fall, the faster the R.O.C. will rise or fall.

MetaStock allows you to select the time period used in the R.O.C. calculation. The time period may range from a very short 1-day R.O.C. (which causes an erratic chart) to a long-term 200-day (or longer) R.O.C. The most popular time periods are the 12-day and 25-day R.O.C. for short to intermediate-term trading and a 1-year (255-day) R.O.C. for long-term analysis.

The 12-day R.O.C. is best used as a short to intermediate-term overbought/oversold indicator. The higher the R.O.C., the more overbought the security; the lower the R.O.C., the more likely a rally. However, as with all overbought/oversold indicators, it is best to wait for the market to begin to correct (i.e., turn up or down) before placing your trade. A market that appears overbought may remain overbought for some time. In fact, extremely overbought/oversold readings usually imply a continuation of the current trend.

The 12-day R.O.C. tends to be very cyclical, oscillating back and forth in a fairly regular pattern. Often, price changes can be anticipated by studying the previous cycles of the R.O.C. and relating the previous cycles to the current market.

The optimum overbought/oversold levels (e.g., +/-5) will vary depending on the security being analyzed and overall market conditions. In strong bull markets, it is usually beneficial to use higher levels, perhaps +10 and -5.

Tips:

- The predefined Price R.O.C. discussed here displays the R.O.C. as a percentage. The R.O.C. also can be displayed as a ratio using the Momentum indicator (page 350), or expressed in points by choosing the Periods radio button in the Properties dialog (page 267).
- An example custom indicator (page 290) shows how to calculate the Price R.O.C.

Price Volume Trend

The Price Volume Trend (PVT) is similar in concept to On Balance Volume (page 361) in that it is a cumulative total of volume that is adjusted depending on changes in closing prices. But whereas OBV adds all volume on days when prices close higher and subtracts all volume on days when prices close lower, the PVT adds only a portion of the daily volume. The amount of volume added to the PVT is a function of the amount by which prices rose or fell relative to the previous day's close.

```
PVT = (((C-ref(C,-1)) / ref(C,-1)) * V) + I
```

Where:

`C`	=	Today's closing price
`ref(C,-1)`	=	Yesterday's closing price
`V`	=	Today's volume
`I`	=	Yesterday's Price Volume Trend

The PVT is calculated by multiplying the day's volume by the percentage change of the underlying security and adding this value to a cumulative total. For example, if the security closed up 0.5% and volume was 10,000 shares, we would add 50 (i.e., 0.005 * 10,000 = 50) to the PVT. If the security had closed down 0.5%, we would have subtracted 50 from the PVT.

References:
- For MetaStock plotting indicators, see page 237.
- For PVT parameters, see page 267.

Interpretation

The interpretation of the Price Volume Trend is similar to the interpretation of On Balance Volume (page 361) and the Volume Accumulation/Distribution Line (page 306).

Many investors feel that the PVT more accurately illustrates the flow of money into and out of a security than does OBV. This is because OBV adds the same amount of volume to the indicator regardless of whether the security closes up a fraction of a point or doubles in price. However, the PVT adds only a small portion of volume to the indicator when the price changes by a small percentage and adds a large portion of volume to the indicator when prices change by a large percentage.

Tip:
- An example custom indicator (page 290) shows how to calculate the Price Volume Trend.

Projection Bands

Projection Bands were developed by Mel Widner, Ph.D. They were originally introduced in the July 1995 issue of *Technical Analysis of Stocks & Commodities* magazine.

Projection Bands are similar in concept to other types of bands including moving average bands, Price Channels (page 370), Envelopes (page 327), and Bollinger Bands (page 310). They also have some of the characteristics of channel lines such as Raff Regression Channels (page 379).

Projection Bands are plotted by finding the minimum and maximum prices over the specified number of days and projecting these forward (parallel to a linear regression line). The resulting plot consists of two bands representing the minimum and maximum price boundaries. Prices will always be contained by the bands, unlike Bollinger Bands.

References:

- For MetaStock plotting indicators, see page 237.
- For Projection Bands parameters, see page 267.

Interpretation

Projections Bands are used much like other types of bands—they help gauge the ebb and flow of optimism and pessimism. When prices are at or near the upper band, extreme optimism is indicated—look for prices to move down to more rational levels. Likewise, when prices are at or near the lower band, extreme pessimism is indicated— look for prices to move up to more rational levels.

It is recommended that all band generated signals be confirmed by other indicators, because prices will often ride along a band for an extended amount of time during strong trending markets. During trending markets, you can use bands to trade short-term reactions against the primary trend. In trading range markets, you can use the bands to trade overbought/oversold levels. Indicators like the VHF (page 406), CMO (page 316), and r-squared (page 377) can be used to gauge the trendiness of the market.

Projection Oscillator

Developed by Mel Widner, Ph.D., the Projection Oscillator is a by-product of his Projection Bands (page 374). The Projection Oscillator is basically a slope-adjusted Stochastic. Where the Stochastic Oscillator (page 393) shows the relationship of the current price to its minimum and maximum prices over a recent time period, the Projection Oscillator shows the same thing, but the minimum and maximum prices are adjusted up/down by the slope of the price's regression line. This adjustment makes the Projection Oscillator more responsive to short-term price moves than an equi-period Stochastic.

Put another way, the Projection Oscillator shows where the current price is relative to the Projection bands. A value of 50 indicates that the current price is exactly in the middle of the bands. A value of 100 indicates that prices are touching the top band. A value of 0 indicates that prices are touching the bottom band.

References:
- For MetaStock plotting indicators, see page 237.
- For Projection Oscillator parameters, see page 268.

Interpretation

The Projection Oscillator can be used as both a short- and intermediate-term trading oscillator depending on the number of time periods used when calculating the oscillator. When displaying a short-term Projection Oscillator (e.g., 10-20 days), it is popular to use a 3-day trigger line.

There are several ways to interpret a Projection Oscillator:

Overbought/oversold. Buy when the oscillator falls below a specific level (e.g., 20) and then rises above that level, and sell when the Oscillator rises above a specific level (e.g., 80) and then falls below that level. High values (i.e., above 80) indicate excessive optimism. Low values (i.e., below 20) indicate excessive pessimism.

However, before basing any trade off of strict overbought/oversold levels, you should first qualify the trendiness of the market using indicators such as r-squared (page 377) or CMO (page 316). If these indicators suggest a non-trending market, then trades based on strict overbought/oversold levels should produce the best results. If a trending market is suggested, then you can use the oscillator to enter trades in the direction of the trend.

Crossovers. Buy when the oscillator crosses above its trigger (dotted) line and sell when the oscillator crosses below its trigger line. You may want to qualify your trades by requiring that the crossovers occur above the 70 level or below the 30 level.

Divergences. You may consider selling if prices are making a series of new highs and the oscillator is failing to surpass its previous highs. You may consider buying if prices are making a series of new lows and the oscillator is failing to surpass its previous low. You may qualify your trades by requiring that the divergence occur above the 70 level or below the 30 level.

Qstick Indicator

The Qstick indicator was developed by Tushar Chande. Qstick provides a way to quantify candlesticks. The distance between the open and close prices lies at the heart of candlestick charting. For those unfamiliar with candlestick charting, the body of a candlestick is black if today's close is less than the open; it is white if today's close is greater than the open. A majority of white candlesticks over a specified range is considered bullish. Whereas a majority of black candlesticks over a specified range is considered bearish.

The Qstick indicator is simply a moving average of the difference between open and close prices. For more information on the Qstick indicator, refer to the book *The New Technical Trader* by Tushar Chande and Stanley Kroll (page 763).

References:
- For MetaStock plotting indicators, see page 237.
- For Qstick parameters, see page 268.

Interpretation

Qstick values below zero indicate a majority of black candlesticks (over the time periods specified) and therefore a bearish bias for the security. Values above zero indicate a majority of white candlesticks (over the time periods specified) and therefore a bullish bias for the security.

There are several ways to trade the Qstick indicator:

Crossovers. Buy when the indicator crosses above zero. Sell when it crosses below zero.

Extreme Levels. Buy when the Qstick indicator is at an extremely low level and turning up. Sell when the Qstick indicator is at an extremely high level and turning down. You may even want to plot a short-term moving average on the Qstick to serve as a trigger line.

Divergences. Buy when the Qstick is moving up and prices are moving down. Sell when the Qstick is moving down and prices are moving up. You may want to consider waiting for the price to confirm the new direction before placing the trade.

Quadrant Lines

Quadrant Lines are a series of horizontal lines that divide the highest and lowest values (usually prices) into four equal sections.

References:
- For general information on drawing line studies, see page 186.
- For Quadrant Line parameters, see page 218.

Interpretation

Quadrant Lines are primarily intended to aid in the visual inspection of price movements. They help you see the highest, lowest, and average price over a specified period.

r-squared

The Linear Regression method provides several useful outputs for technical analysts, including the r-squared. R-squared shows the strength of trend. The more closely prices move in a linear relationship with the passing of time, the stronger the trend.

References:
- For MetaStock plotting indicators, see page 237.
- For r-squared parameters, see page 268.
- You may find the expert named “Equis - Statistical Analysis” helpful in interpreting r-squared. For more information on experts, see page 582.

Interpretation

r-squared values show the percentage of movement that can be explained by linear regression. For example, if the r-squared value over 20 days is at 70%, this means that 70% of the movement of the security is explained by linear regression. The other 30% is unexplained random noise.

It is helpful to consider r-squared in relation to Slope (page 402). While Slope gives you the general direction of the trend (positive or negative), r-squared gives you the strength of the trend. A high r-squared value can be associated with a high positive or negative Slope.

Although it is useful to know the r-squared value, ideally, you should use r-squared in tandem with Slope. High r-squared values accompanied by a small Slope may not interest short term traders. However, high r-squared values accompanied by a large Slope value may be of huge interest to traders.

One of the most useful way to use r-squared is as a confirming indicator. Momentum based indicators (e.g., Stochastics, RSI, CCI, etc.) and moving average systems require a confirmation of trend in order to be consistently effective. R-squared provides a means of quantifying the "trendiness" of prices. If r-squared is above its critical value and heading up, you can be 95% confident that a strong trend is present.

When using momentum based indicators, only trade overbought/oversold levels if you have determined that prices are trendless or weakening (i.e., a low or lowering r-squared value). Because in a strong trending market, prices can remain overbought or oversold for extended periods. Therefore, you may want to reconsider trading on strict overbought/oversold levels used by many indicators. An "overbought" market can remain overbought for extended periods in a trending market. However, a signal generated by a moving average crossover system may be worth following, since these systems work best in strong trending markets.

To determine if the trend is statistically significant for a given x-period linear regression line, plot the r-squared indicator and refer to the following table. This table shows the values of r-squared required for a 95% confidence level at various time periods. If the r-squared value is less than the critical values shown, you should assume that prices show no statistically significant trend.

Number of Periods	r-squared Critical Value (95% confidence)
5	0.77
10	0.40
14	0.27
20	0.20
25	0.16
30	0.13
50	0.08
60	0.06
120	0.03

You may even consider opening a short-term position opposite the prevailing trend when you observe r-squared rounding off at extreme levels. For example, if the slope is positive and r-squared is above 0.80 and begins to turn down, you may consider selling or opening a short position. There are numerous ways to use the linear regression outputs of r-squared and Slope in trading systems. For more detailed coverage, refer to the book *The New Technical Trader* by Tushar Chande and Stanley Kroll (page 763).

Raff Regression Channel

Developed by Gilbert Raff, the regression channel is a line study that plots directly on the price chart. The Regression Channel provides a precise quantitative way to define a price trend and its boundaries.

The Regression Channel is constructed by plotting two parallel, equidistant lines above and below a Linear Regression trendline. The distance between the channel lines to the regression line is the greatest distance that any one high or low price is from the regression line.

For more detailed information on using the Raff Regression Channel, we recommend the book *Trading the Regression Channel* by Gilbert Raff, available directly from Equis International (page 765).

References:
- For general information on drawing line studies, see page 186.
- For Raff Regression Channel parameters, see page 186.

Interpretation

Raff Regression Channels contain price movement, with the bottom channel line providing support and the top channel line providing resistance. Prices may extend outside of the channel for a short period of time. However, if prices remain outside the channel for a long period of time, a reversal in trend may be imminent.

Random Walk Index

In an effort to find an indicator that overcomes the effects of a fixed look-back period and the drawbacks of traditional smoothing methods, Michael Poulos developed the Random Walk Index. The Random Walk Index is based on the basic geometric concept that the shortest distance between two points is a straight line. The further prices stray from a straight line during a move between two points in time, the less efficient the movement.

References:
- For MetaStock plotting indicators, see page 237.
- For Random Walk Index parameters, see page 269.

Interpretation

Mr. Poulos found significant evidence during his research that the "dividing line" between short- and long-term time frames for most futures and stocks is right around eight to 10 days. Therefore, he feels an effective trading system using the RWI can be devised using two different time frames—a short-term RWI (two to seven periods) for the market's frantic, random side and a long-term RWI (eight to 64 periods) for the market's steady, trending side.

Peaks in the short-term RWI of highs tend to coincide with price peaks. Peaks in the short-term RWI of lows tend to coincide with price troughs.

Readings of the long-term RWI of highs above 1.0 provides a good indication of a sustainable uptrend. Readings of the long-term RWI of lows above 1.0 provide a good indication of a sustainable downtrend.

Therefore Mr. Poulus feels that an effective trading system could be built that opens trades (after short-term pull-backs against the direction of the long-term trend) using the following guidelines:

- Buy Order (or close short) when the long-term RWI of the highs is greater than 1.0, and the short-term RWI of lows peaks above 1.0.
- Sell Short Order (or Sell Order) when the long-term RWI of the lows is greater than 1.0, and the short-term RWI of highs peaks above 1.0.

Range Indicator

The Range Indicator was developed by Jack Weinberg. It was introduced in the June 1995 issue of *Technical Analysis of Stocks & Commodities* magazine. Mr. Weinberg developed this indicator based on his observation that changes in the average day's intraday range (high to low) as compared to the average day's interday range (close to close) precede the start of a new trend or the end of the current trend.

References:
- For MetaStock plotting indicators, see page 237.
- For Range Indicator parameters, see page 269.

Interpretation

The Range Indicator shows when the intraday high to low ranges exceed the interday close to close ranges.

This approach proves useful in identifying the start and end of trends. When the intraday ranges are dramatically higher than the interday ranges, the market is considered "out of balance," and the Range Indicator will be at a high level. When at a high level, look for the current trend to end. Conversely, when the Range Indicator is at a low level (below 20 for example), look for the emergence of a new trend.

Mr. Weinberg found that the Range Indicator improves many momentum and trend-following trading systems. For example, he found that the results of a basic two moving average crossover system on the four major currencies were dramatically improved by filtering the signals with the Range Indicator. By waiting to enter a long position until the Range Indicator crossed above a defined low level and then waiting to exit until the indicator crossed above a defined high level, profits, number of trades, and risk were dramatically improved.

Relative Momentum Index

The Relative Momentum Index (RMI) was developed by Roger Altman. Impressed with the Relative Strength Index's insensitivity to the number of lookback periods, yet frustrated with it's inconsistent oscillation between defined overbought and oversold levels, Mr. Altman added a momentum component to the RSI. The RMI was first introduced in the February 1993 issue of *Technical Analysis of Stocks & Commodities* magazine.

As mentioned, the RMI is a variation of the RSI indicator. Instead of counting up and down days from close to close as the RSI does, the RMI counts up and down days from the close relative to the close x-days ago (where x is not necessarily 1 as required by the RSI). So as the name of the indicator reflects, "momentum" is substituted for "strength."

References:
- For MetaStock plotting indicators, see page 237.
- For Relative Momentum Index parameters, see page 270.

Interpretation

As an oscillator, the RMI exhibits the same strengths and weaknesses of other overbought/oversold indicators. During strong trending markets the RMI will remain at overbought or oversold levels for an extended period. However, during non-trending markets, the RMI tends to oscillate predictably between an overbought level of 70 to 90 and an oversold level of 10 to 30.

Since the RMI is based on the RSI, many of the same interpretation methods can be applied. In fact, many of these "situations" are more clearly manifest with the RMI than they are with the RSI.

Tops and Bottoms. The RMI usually tops above 70 and bottoms below 30. The RMI usually forms these tops and bottoms before the underlying price chart.

Chart Formations. The RMI often forms chart patterns (such as head and shoulders or rising wedges) that may or may not be visible on the price chart.

Failure Swings. (Also known as support or resistance penetrations or breakouts.) This is where the RMI surpasses a previous high (peak) or falls below a recent low (trough).

Support and Resistance. The RMI shows, sometimes more clearly than the price chart, levels of support and resistance.

Divergence. As discussed above, this occurs when the price makes a new high (or low) that is not confirmed by a new RMI high (or low).

Notice that a 20,1 parameter RMI is equivalent to a 20-period RSI. This is because the 1-day momentum parameter is calculating

day-to-day price changes, which the standard RSI does by default. As the momentum parameter is increased, the oscillation range of the RMI becomes wider and the fluctuations become smoother.

Relative Performance

The Relative Performance indicator compares two securities to show how the securities are performing relative to each other. Be careful not to confuse the Relative Performance with the Relative Strength Index.

The Relative Performance indicator is calculated by dividing one security's prices by a second security's price. The result of this division is the ratio, or relationship, between the two securities. When using the Relative Performance, you can choose the date to start calculating the relationship.

Another way to display the Relative Performance of two securities is to create a composite security using The DownLoader (see page 677 for more information.)

Interpretation

A Relative Performance indicator compares a security's price with that of another security. When the indicator is moving up, it shows that the security (the one displayed in the chart) is performing better than the selected security. When the indicator is moving sideways, it shows that both securities are performing the same (i.e., rising and falling by the same percentages). When the indicator moves down, it shows that the security is performing worse than the selected security (i.e., not rising as fast or falling faster).

Stock and mutual fund traders may find it helpful to track the Relative Performance between the stocks and funds you are following and an index such as the NASDAQ Composite or the Dow Industrials. Or you may want to do a comparison with a closely tied industry group. For example, if you were following Ford, a Relative Performance between Ford and the S&P Auto Index would be helpful to show how Ford is performing relative to the entire auto industry.

Futures Traders may find it helpful to compare futures with the CRB index. Or perhaps one future with another. For example, Gold and Silver, the Yen and the Pound, Bonds and the Dollar, etc.

Relative Strength Comparative

The Relative Strength Comparative indicator compares two securities to show how the securities are performing relative to each

other. Be careful not to confuse Comparative Relative Strength with the Relative Strength Index.

Comparative Relative Strength is calculated by dividing one security's prices by a second security's price. The result of this division is the ratio, or relationship, between the two securities.

Another way to display the Comparative Relative Strength of two securities, is to create a composite security using The DownLoader (see *The DownLoader User's Manual* for more information.)

References:
- For MetaStock plotting indicators, see page 237.
- For Relative Strength Comparative parameters, see page 270

Interpretation

A Comparative Relative Strength chart compares a security's price with that of another security. When the indicator is moving up, it shows that the security (the one displayed in the chart) is performing better than the selected security. When the indicator is moving sideways, it shows that both securities are performing the same (i.e., rising and falling by the same percentages). When the indicator moves down, it shows that the security is performing worse than the selected security (i.e., not rising as fast or falling faster).

Stock and mutual fund traders may find it helpful to track the Comparative Relative Strength between the stocks and funds you are following and an index such as the NASDAQ Composite or the Dow Industrials. Or you may want to do a comparison with a closely tied industry group. For example, if you were following Ford, a Comparative Relative Strength between Ford and the S&P Auto Index would be helpful to show how Ford is performing relative to the entire auto industry.

Futures Traders may find it helpful to compare futures with the CRB index. Or perhaps one future with another. For example, Gold and Silver, the Yen and the Pound, Bonds and the Dollar, etc.

Tip:
- When using a composite security to create a Relative Strength Comparative, the value is stored in the price fields (rather than the indicator field). This enables you to easily display indicators of Relative Strength Comparatives.

Relative Strength Index

The Relative Strength Index (RSI) is a popular oscillator used by commodity traders. It was first introduced by J. Welles Wilder in an article in *Commodities* magazine (now known as *Futures*) in June 1978. Step-by-step instructions on calculating and interpreting the RSI are also provided in Mr. Wilder's book, *New Concepts in Technical Trading Systems* (page 765).

The name "Relative Strength Index" is slightly misleading as the RSI does *not* compare the relative strength of two securities, but rather the internal strength of a single security. A more appropriate name might be "Internal Strength Index."

The RSI is a fairly simple formula, but is difficult to explain without pages of examples. The basic formula is:

$$RSI = 100 - \left[\frac{100}{1 + \frac{U}{D}} \right]$$

Where:

U=An average of upward price change.
D=An average of downward price change.

MetaStock prompts you to enter the number of time periods in the averages.

References:
- For MetaStock plotting indicators, see page 237.
- For RSI parameters, see page 271.

Interpretation

When Wilder introduced the RSI, he recommended using a 14-day RSI. Since then, the 9-day and 25-day RSIs have also gained popularity. Because you can vary the number of time periods in the RSI calculation, we suggest that you experiment to find the period that works best for you. (The fewer days used to calculate the RSI, the more volatile the indicator.)

The RSI is a price-following oscillator that ranges between 0 and 100. A popular method of analyzing the RSI is to look for a divergence in which the market index is making a new high, but the RSI is failing to surpass its previous high. This divergence would be an indication of an impending reversal. When the RSI then turns down and falls below its most recent trough, it is said to have completed a failure swing. The failure swing would be considered a confirmation of an impending reversal.

In Mr. Wilder's book, he discusses five uses of the RSI in analyzing commodity charts (these apply to indices as well):

Tops and Bottoms. The RSI usually tops above 70 and bottoms below 30 (MetaStock automatically draws horizontal lines at these levels). The RSI usually forms these tops and bottoms before the underlying price chart.

Chart Formations. The RSI often forms chart patterns (such as head and shoulders or rising wedges) that may or may not be visible on the price chart.

Failure Swings. (also known as support or resistance penetrations or breakouts): This is where the RSI surpasses a previous high (peak) or falls below a recent low (trough).

Support and Resistance. The RSI shows, sometimes more clearly than the price chart, levels of support and resistance.

Divergence. As discussed above, this occurs when the price makes a new high (or low) that is not confirmed by a new RSI high (or low).

For additional information on the RSI, refer to Mr. Wilder's book.

Relative Volatility Index

The Relative Volatility Index (RVI) was developed by Donald Dorsey. It was originally introduced in the June 1993 issue of *Technical Analysis of Stocks and Commodities* (TASC) magazine. A revision to the indicator was covered in the September 1995 issue.

The RVI is used to measure the direction of volatility. The calculation is identical to the Relative Strength Index (RSI) (page 384) except that the RVI measures the standard deviation of daily price changes rather than absolute price changes.

References:
- For MetaStock plotting indicators, see page 237.
- For RVI parameters, see page 271.

Interpretation

When developing the RVI, Dorsey was searching for a confirming indicator to use with traditional trend-following indicators (such as a dual moving average crossover system). He found that using a momentum-based indicator to confirm another "repackaged" momentum-based indicator is usually ineffective. Dorsey made this clear in his June 1993 TASC article:

> *"Technicians are tempted to use one set of indicators to confirm another. We may decide to use the MACD to confirm a signal in Stochastic... Logic tells us that this form*

of diversification will enhance results, but too often the confirming indicator is just the original trading indicator repackaged, each using a theory similar to the other to measure market behavior... Every trader should understand the indicators being applied to the markets to avoid duplicating information."

When testing the profitability of a basic moving average crossover system, Dorsey found that the results could be significantly enhanced by applying the following RVI rules for confirmation. Similar rules are likely to be effective for other momentum or trend following indicators.

- Only act on buy signals when RVI > 50.
- Only act on sell signals when RVI < 50.
- If a buy signal is ignored, enter long if RVI > 60.
- If a sell signal is ignored, enter short if RVI < 40.
- Close a long position if RVI falls below 40.
- Close a short position if RVI rises above 60.

Because the RVI measures a different set of market dynamics than other indicators, it is often superior as a confirming indicator. As Dorsey states:

"There is no reason to expect the RVI to perform any better or worse than the RSI as an indicator in its own right. The RVI's advantage is as a confirming indicator because it provides a level of diversification missing in the RSI."

Renko

The Renko charting method is thought to have acquired its name from "renga" which is the Japanese word for bricks. Renko charts were introduced by Steve Nison (a well-known authority on the Candlestick charting method).

Renko charts are similar to Three Line Break charts except that in a Renko chart, a line (or brick as they are sometimes called) is drawn in the direction of the prior move only if a fixed amount (i.e., the box size) has been exceeded. The bricks are always equal in size. For example, in a five unit Renko chart, a 20 point rally is displayed as four equally sized, five unit high Renko bricks.

To draw Renko bricks, today's close is compared with the high and low of the previous brick (white or black). When the closing price rises above the top of the previous brick by the box size or more, one or more equal

height, white bricks are drawn in the next column. If the closing price falls below the bottom of the previous brick by the box size or more, one or more equal height, black bricks are drawn in the next column.

If the market moves up more than the amount required to draw one brick, but less than the amount required to draw two bricks, only one brick is drawn. For example, in a two-unit Renko chart, if the base price is 100 and the market moves to 103, then one white brick is drawn from the base price of 100 to 102. The rest of the move — from 102 to 103— is not shown on the Renko chart. The same rule applies anytime the price does not fall on a box size divisor.

Indicators calculated on Renko charts use all the data in each column and then display the average value of the indicator for that column.

Interpretation

Basic trend reversals are signaled with the emergence of a white or black brick. A new white brick indicates the beginning of a new uptrend. A new black brick indicates the beginning of a new downtrend. Since the Renko chart is a trend following technique, there will be times when the market induces whipsaws. However, a trend following technique is intended to allow traders to ride on the major portion of the trend.

Since a Renko chart isolates the underlying trends by filtering out the minor ups and downs, Renko charts are excellent for helping determine support and resistance levels.

For more in-depth coverage of the Renko charting method, we recommend the book *Beyond Candlesticks* by Steve Nison (page 765).

Speed Resistance Lines

Speed Resistance Lines, also called 1/3 - 2/3 lines, are a series of trendlines that divide a price move into three equal sections. They are similar in construction and interpretation to Fibonacci Fan Lines (page 330).

References:
- For drawing MetaStock line studies, see page 186.
- For Speed Resistance Line parameters, see page 221.

Interpretation

Speed Resistance Lines are used to define price support levels. For example, if a security is in a rising trend, its price will usually stay above the 2/3 Speed Line. If prices do penetrate the 2/3 line, they will generally fall all the way to the 1/3 line before regaining support.

Spread

Spreads compare two securities to show how the securities are performing *relative* to each other. Spreads are normally calculated using futures.

A spread is calculated by subtracting the value of one security from the value of another security. To display a spread of two securities, you can create a composite security using The DownLoader (page 74), or you can plot the Spread indicator.

When creating the composite with The DownLoader, be sure to select *Subtract* as the operator type. Enter the appropriate *Weighting Factor.* Certain futures spreads require that one future have more or less weight than the other. The Weighting Factor may be used to specify the weight for each future in the spread, so a Weighting Factor of 0.40 multiplies the future's prices by 0.40. Entering a Weighting Factor of 1.00 for both futures in the composite gives each equal weight.

References:
- For MetaStock plotting indicators, see page 237.
- For Spread parameters, see page 271

Interpretation

A Spread involves buying one security and selling another with the goal of profiting from the narrowing or expanding of the spread between the two items. For example, you might buy gold and sell silver short with the expectation that the price of silver will fall faster (or rise slower) than the price of gold.

Tip:
- When using a composite security to create a spread, the value of the spread is stored in the price fields (rather than the indicator field). This enables you to display indicators of Spreads.

Standard Deviation

Standard Deviation is a statistical measurement of volatility. It is derived by calculating an *x*-time period simple moving average of the data item (i.e., the closing price or an indicator); summing the squares of the difference between the data item and its moving average over each of the preceding *x*-time periods; dividing this sum by *x*; and then calculating the square root of this result.

References:
- For MetaStock plotting indicators, see page 237.
- For Standard Deviation parameters, see page 468.

Interpretation

Standard Deviation is typically used as a component of an indicator, rather than as a stand-alone indicator. For example, Bollinger Bands

(page 310) are calculated by adding a security's Standard Deviation to a moving average.

High Standard Deviation values signify high volatility: the data item being analyzed is deviating from its moving average significantly. Similarly, low Standard Deviation values signify low volatility; the data item is remaining close to its moving average.

Typically, low Standard Deviation values (i.e., low volatility) tend to come before significant upward price changes.

Many analysts agree that major tops are normally accompanied with high volatility and major bottoms are generally calm with low volatility.

Tips:
- An example custom indicator (page 290) shows how to calculate Standard Deviation.
- The ODDS Probability Cones are calculated using standard deviation-based volatility (page 359).

Standard Deviation Channel

Standard Deviation Channels are calculated by plotting two parallel lines above and below an x-period linear regression trendline. The lines are plotted *x* standard deviations away from the linear regression trendline.

References:
- For general information on drawing line studies, see page 186.
- For Standard Deviation Channel parameters, see page 222.

Interpretation

Price movements are characterized by swings from one extreme to the other. Markets reflect the collective mood if its participants. When market participants are overly optimistic, prices are driven up at an unsustainable rate. Likewise, when market participants are overly pessimistic, prices are beaten down at an unsustainable rate. The keywords here are "extreme" and "unsustainable." Even the most raging bull markets or violent bear markets will either pause for a breather or reverse temporarily.

Markets tend to have an equilibrium point (i.e., a point towards which prices tend to be drawn). Linear regression analysis is helpful in determining where this "balancing point" lies. On the other hand, standard deviation analysis is helpful in determining where the "extremes" lie.

Elementary statistical analysis states that approximately 67% of future price movement should be contained within one standard deviation and approximately 95% within two standard deviations. However, this assumes random, trendless data. Since most markets show overwhelming evidence of non-random, trending behavior,

these 67% and 95% values are not as accurate. Standard Deviation channels, however, incorporate the trend (as measured by the middle linear regression plot). Therefore, they provide a trend-biased assessment of expected price movement.

Standard Deviation Channels can be used to enhance several types of technical analysis techniques. Here are some ideas:

- **Validate candlestick patterns.** Enter long on bullish engulfing lines only if they form below the bottom channel line.
- **Validate overbought/oversold signals.** Close long (or enter short) when the Stochastic falls below 80, volume is above average, and prices have recently fallen below the top channel line.
- **Validate support/resistance breakouts.** If prices have broken above a long-term resistance level, yet volume is suspiciously light, wait until the prices break above the upper channel on above average volume.

Standard Error

Standard Error measures how closely prices congregate around a linear regression line. The closer prices are to the linear regression line, the higher the r-squared value and the stronger the trend.

For example, if each day's closing price was equal to that day's regression line value, then the standard error would be zero. The more variance or "noise" around the regression value, the larger the standard error and the less reliable the trend.

References:
- For MetaStock plotting indicators, see page 237.
- For Standard Error parameters, see page 272.

Interpretation

High standard error values indicate that the security's prices are very volatile around the regression line. Changes in the prevailing trend (over the number of time periods specified) are usually preceded by a rapidly increasing standard error.

Standard error can be used effectively in combination with the r-squared indicator (page 377). Changes in trend are often signaled by a high downward moving r-squared, a low upward moving standard error, or a low upward moving r-squared and a high downward moving standard error. In other words, when the two are at extreme levels and begin to converge, look for a change in trend.

Note: A change in trend does not necessarily mean that an upward trend will reverse to a downward trend. Sideways movement is also considered a "change."

Standard Error Bands

Standard Error Bands are a type of envelope (page 327) developed by Jon Andersen. They are similar to Bollinger Bands in appearance, but they are calculated and interpreted quite differently. Where Bollinger Bands (page 310) are plotted at *standard deviation* levels above and below a *moving average*, Standard Error Bands are plotted at *standard error* levels above and below a *linear regression* plot.

References:
- For MetaStock plotting indicators, see page 237.
- For Standard Error Bands parameters, see page 272.
- For a definition of standard error, see page 272

Interpretation

When displaying Standard Error Bands, you are prompted to enter the number of periods in the bands and the number of standard errors between the bands and the linear regression line (page 344). Mr. Andersen recommends default values of “21” for the number of periods, a 3-day simple moving average for the smoothing, and “2” standard errors. He also notes that very short time frames tend to produce unreliable results.

MetaStock plots Standard Error Bands on the security’s prices or indicator. These interpretational comments refer to bands on the security’s closing price. Because the spacing between Standard Error Bands is based on the standard error of the security, the bands widen when the volatility around the current trend increases, and contract when volatility around the current trend decreases.

Since Standard Error Bands are statistically based, other statistical indicators such as r-squared, Standard Error, Linear Regression, etc. work well for trade confirmation.

Mr. Andersen notes the following characteristics of Standard Error Bands.

- Tight bands are an indication of a strong trend.
- Prices tend to bounce between the bands when the bands are wide.
- Tight bands followed by a widening of the bands may indicate the exhaustion of a trend and a possible reversal.
- When the bands reverse direction after an exhausted trend, prices tend to move in the direction of the bands.
- The r-squared indicator works well in combination with Standard Error Bands. A high r-squared value combined with tight bands confirms a strong trend. A low r-squared value combined with wide bands confirms that prices are consolidating.

Standard Error Channel

Standard Error Channels are calculated by plotting two parallel lines above and below an x-period linear regression trendline. The lines are plotted a specified number of standard errors away from the linear regression trendline.

References:
- For drawing MetaStock line studies, see page 186.
- For Standard Error Channel parameters, see page 224.

Interpretation

Price movements are characterized by swings from one extreme to the other. Markets reflect the collective mood if its participants. When market participants are overly optimistic, prices are driven up at an unsustainable rate. Likewise, when market participants are overly pessimistic, prices are beaten down at an unsustainable rate. The keywords here are “extreme” and “unsustainable.” Even the most raging bull markets or violent bear markets will either pause for a breather or reverse temporarily.

Markets tend to have an equilibrium point (i.e., a point towards which prices tend to be drawn). Linear regression analysis is helpful in determining where this “balancing point” lies. On the other hand, standard error analysis is helpful in determining where the “extremes” lie.

Standard Error Channels can be used to enhance several types of technical analysis techniques. Here are some ideas:

- **Validate candlestick patterns.** Enter long on bullish engulfing lines only if they have formed below the bottom channel line.
- **Validate overbought/oversold signals.** Close long (or enter short) when the Stochastic falls below 80, volume is above average, and prices have recently fallen below the top channel line.
- **Validate support/resistance breakouts.** If prices have broken above a long-term resistance level, yet volume is suspiciously light, wait until the prices break above the upper channel on above average volume.

Stochastic Momentum Index

The Stochastic Momentum Index (SMI) was developed by William Blau. It incorporates an interesting twist on the popular Stochastic Oscillator. While the Stochastic Oscillator provides you with a value showing the distance the current close is relative to the recent x-period high/low range, the SMI shows you where the close is relative to the *midpoint* of the recent x-period high/low range.

The result is an oscillator that ranges between +/- 100 and is a bit less erratic than an equal period Stochastic Oscillator.

The SMI was introduced in the January 1993 issue of *Technical Analysis of Stocks & Commodities* (TASC) magazine. An example formula (page 344) illustrates the calculation of the Stochastic Momentum Index.

References:
- For MetaStock plotting indicators, see page 237.
- For Stochastic Momentum Index parameters, see page 273.
- For Stochastic Oscillator interpretation, see page 393.

Interpretation

If the close is greater than the midpoint of the range, the SMI is positive. If the close is less than the midpoint of the range, it's negative.

The interpretation of the SMI is virtually identical to the Stochastic Oscillator. Three popular methods include:

- Buy when the SMI falls below a specific level (e.g., -40) and then rises above that level, and sell when the Oscillator rises above a specific level (e.g., +40) and then falls below that level. However, before basing any trade off of strict overbought/ oversold levels it is recommended that you first qualify the trendiness of the market using indicators such as r-squared (page 377) or CMO (page 316). If these indicators suggest a non-trending market, then trades based on strict overbought/ oversold levels should produce the best results. If a trending market is suggested, then you can use the oscillator to enter trades in the direction of the trend.
- Buy when the SMI rises above its signal line (dotted) line and sell when the SMI falls below the signal line.
- Look for divergences. For example, where prices are making a series of new highs and the SMI is failing to surpass its previous highs.
- Mr. Blau also notes that a 1-day SMI (with large smoothing periods such as 100) is very sensitive to the close relative to the high and low of the day. These type of parameters make the RMI useful as a sentiment, or trend identification indicator, thereby providing a better sense of the overall direction of the market.

Stochastic Oscillator

Sto.chas.tic *(sto kas'tik) adj. 2. Math. designating a process having an infinite progression of jointly distributed random variables.*
— Webster's

The Stochastic Oscillator compares where a security's price closed relative to its trading range over the last *x*-time periods.

The formula for the %K parameter of the Stochastic is:

$$\frac{(\text{close today}) - (\text{lowest low \%K periods})}{(\text{highest high \%K periods}) - (\text{lowest low \%K periods})}$$

For example, to calculate a 10-day %K: First, find the security's highest high and lowest low over the last 10 days. For this example, let's assume that during the last 10 days the highest high was 46 and the lowest low was 38— a range of 8 points. If today's closing price was 41, %K would be calculated as:

$$\frac{41 - 38}{46 - 38} = 3 \Delta \; 8 = \; 0.375$$

The 0.375 in this example shows that today's close was at the level of 37.5% relative to the security's trading range over the last 10 days. If today's close was 42, the Stochastic Oscillator would be 0.50. The 0.50 would show that the security closed today at 50%, or the midpoint, of its 10-day trading range.

The above example used a %K Slowing Period of 1 day (no slowing). If you use a Slowing Period of greater than 1 period, you would total the value of the numerators for the number of Slowing Periods, then total the value of the denominators for the number of Slowing Periods, and then perform the division. For example, to calculate a 10-day %K with 3-period slowing, you would sum the value of the numerators (i.e., today's close minus the lowest low in the last 10 periods) for each of the last three periods, then sum the value of the denominators (i.e., the highest high in the last 10 periods minus the lowest low in the last 10 periods) for each of the last three periods, and finally divide the sum of the numerators by the sum of the denominators. A moving average of %K is then calculated using the number of time periods you specified in the %D Periods. This moving average is called %D.

Finally, MetaStock multiplies all stochastic values by 100 to change decimal values into percentages for better scaling (e.g., 0.375 is displayed as 37.5%).

The Stochastic Oscillator always ranges between 0% and 100%. A reading of 0% shows that the security's close was the lowest price that the security has traded during the preceding *x*-time periods. A reading of 100% shows that the security's close was the highest price that the security has traded during the preceding *x*-time periods.

References:

- For MetaStock plotting indicators, see page 237.
- For Stochastic Oscillator parameters, see page 273.

Interpretation

Stochastic Oscillators can be used as both short- and intermediate-term trading oscillators depending on the number of time periods used when calculating the oscillator. When displaying a short term Stochastic Oscillator (e.g., 5-25 days), it is popular to slow the %K value by 3-days.

There are several ways to interpret a Stochastic Oscillator. Three popular methods include:

- Buy when the Oscillator (either %K or %D) falls below a specific level (e.g., 20) and then rises above that level, and sell when the Oscillator rises above a specific level (e.g., 80) and then falls below that level. However, before basing any trade off of strict overbought/oversold levels it is recommended that you first qualify the trendiness of the market using indicators such as r-squared (page 377) or CMO (page 316). If these indicators suggest a non-trending market, then trades based on strict overbought/oversold levels should produce the best results. If a trending market is suggested, then you can use the oscillator to enter trades in the direction of the trend.
- Buy when the %K line rises above the %D (dotted) line and sell when the %K line falls below the %D line.
- Look for divergences. For example, where prices are making a series of new highs and the Stochastic Oscillator is failing to surpass its previous highs.

Tips:

- MetaStock's Enhanced System Tester (page 503) can be used to automatically generate buy/sell signals based on methods #1 and #2 (above).
- An example custom indicator (page 290) shows how to calculate the Stochastic Oscillator.
- You may find the expert named "Equis - Stochastic Oscillator" helpful in interpreting the Stochastic Oscillator. For more information on experts, see page 582.

Support and Resistance Levels

Think of security prices as the result of a head-to-head battle between a bull (the buyer) and a bear (the seller). The bulls push prices higher and the bears push prices lower. The direction prices actually move reveals who is winning the battle.

Using this analogy, consider the following chart of Motorola. Between August of 1989 and February of 1990, Motorola rose to the price level of 15.75 several times where it encountered upside

resistance. Also note how when the price dropped to 13.25 it encountered downside support.

Savvy investors could see that Motorola was locked in a trading range (between 13.25 and 15.75) and knew that it would have to break out of this range. What direction? Who knows! The fact was that the security was bound to break out. The longer it remained in its trading range, the more powerful the anticipated breakout.

The price breakout finally occurred in March 1990 when prices rose above their resistance level. Once the upside resistance line was penetrated on a *closing* basis, the price of the security rose rapidly. (The penetration of support/resistance levels is usually accompanied with an increase in volume.)

After the quick rise, the price dropped downward once again. When the price reached the line that had previously been upside resistance, it encountered downside support and was unable to fall further. This is a well-documented phenomena. Once penetrated, resistance lines become support lines. Similarly, when prices fall below support lines, the support lines usually provide price resistance.

Swing Index

The Swing Index seeks to isolate the "real" price of a security by comparing the relationships between the current prices (i.e., open, high, low, and close) and the previous period's prices.

Note: The Swing Index requires opening prices.

Tip:
- Step-by-step instructions on calculating the Swing Index are provided in Wilder's book, *New Concepts In Technical Trading Systems* (page 765).

References:
- For MetaStock plotting indicators, see page 237.
- For Swing Index parameters, see page 274.
- Refer to the Accumulation Swing Index (page 307) for additional interpretational information regarding the Swing Index and the "limit move."

Interpretation

Wilder notes the following characteristics of the Swing Index.

- It provides a numerical value that quantifies price swings.
- It defines short-term swing points.
- It cuts through the maze of high, low, and close prices and indicates the real strength and direction of the market.

TEMA

TEMA is a unique smoothing indicator developed by Patrick Mulloy. It was originally introduced in the January 1994 issue of *Technical Analysis of Stocks & Commodities* (TASC) magazine. As Mr. Mulloy explains in the article:

> *"Moving averages have a detrimental lag time that increases as the moving average length increases. The solution is a modified version of exponential smoothing with less lag time."*

TEMA is an acronym that stands for **T**riple **E**xponential **M**oving **A**verage. However, the name of this smoothing technique is a bit misleading in that it is not simply a moving average of a moving average of a moving average. It is a unique composite of a single exponential moving average, a double exponential moving average, and a triple exponential moving average that provides less lag than either of the three components individually.

References:
- For MetaStock plotting indicators, see page 237.

- For TEMA parameters, see page 275
- For Stochastic Oscillator parameters, see page 273
- For Exponential Moving Average calculation, see page 352.
- For information on DEMA, a similar smoothing method developed by Mr. Mulloy, see page 321.

Interpretation

TEMA can be used in place of traditional moving averages. You can use it to smooth price data or other indicators. Some of Mr. Mulloy's original testing of TEMA was done on the MACD. Oddly, he found that the *faster* responding TEMA-smoothed MACD produced fewer (yet more profitable) signals than the traditional 12/26 smoothed-MACD. A custom indicator named "MACD (TEMA-smoothed)" is included with MetaStock.

Tip:
- This type of smoothing is certainly not limited to the MACD. You may want to experiment on other indicators as well.

Three Line Break

Three Line Break charts originate from Japan and were introduced to the western world by Steve Nison (a well-known authority on the Candlestick charting method). The Three Line Break charting method gets its name from the default number of line blocks typically used.

Using the closing price, a new white block is added in a new column if the previous high price is exceeded. A new black block is drawn if the close makes a new low. If there is neither a new high or low, nothing is drawn.

With a default Three Line Break, if a rally is powerful enough to form three consecutive white blocks, then the low of the last three white blocks must be exceeded before a black block is drawn. If a selloff is powerful enough to form three consecutive black blocks, then the high of the last three black blocks must be exceeded before a white block is drawn.

To draw line break blocks, today's close is compared to the high and low of the previous block. A block is drawn only when today's close exceeds the high or low of the previous block. If today's close is higher than the top of the previous block, a new white block is drawn in the next column from the prior high to the new high price. If today's close is lower than the bottom of the previous block, a new black block is drawn in the next column from the prior low to the

new low price. If the close fails to move outside the range of the previous blocks high or low, then nothing is drawn.

With the default Three Line Break chart, a downside reversal (i.e., white blocks change to black blocks) occurs when the price moves under the lowest price of the last three consecutive white blocks. A black reversal block is drawn from the bottom of the highest white block to the new price. An upside reversal (i.e., black blocks change to white blocks) occurs when the price moves above the highest price of the last three consecutive black blocks. A white reversal block is drawn from the top of the lowest black block to the new high price. Indicators calculated on Three Line Break charts use all the data in each column and then display the average value of the indicator for that column.

References:

- For MetaStock plotting indicators, see page 237.
- For more in-depth coverage of the Three Line Break charting method, we recommend the book *Beyond Candlesticks* by Steve Nison (page 765).

Interpretation

There are many ways to trade with Three Line Break charts. The most basic method involves buying when a white block emerges after three prior black blocks, or selling when a black block appears after three white blocks.

An advantage of the Three Line Break chart is that there is no arbitrary fixed reversal amount. It is the market's action which gives the indication of a reversal. Reversal signals in Three Line Break charts are sent well after the new trend has started. However, many traders are comfortable with this insofar as they believe that it is safer to be in for the major part of the trend rather than trying to pick a top or bottom.

To adjust the sensitivity of the reversal criteria, traders can adjust the number of blocks that need to be broken before a reversal is drawn. Thus, two line or four line break charts can be used instead of the standard Three Line Break charts. Shorter time frame traders should use shorter reversal amounts (e.g., two or three), whereas longer term investors should use longer reversal amounts (e.g., five or even ten). The most popular line break chart in Japan is the Three Line Break chart.

Time Series Forecast

The Time Series Forecast indicator is based on the trend of a security's price over a specified time period. The trend is determined by calculating a linear regression trendline using the "least squares fit" method. The least squares fit technique fits a trendline to the data in the chart by minimizing the distance between the data points and the linear regression trendline.

Any point along the Time Series Forecast is equal to the ending value of a Linear Regression trendline plus its slope. For example, the ending value of a Linear Regression trendline (plus its slope) that covers 10 days will have the same value as a 10-day Time Series Forecast. This differs slightly from the Linear Regression indicator (page 342) in that the Linear Regression indicator does not add the slope to the ending value of the regression line. This makes the TSF a bit more responsive to short term price changes. If you plot the TSF and the Linear Regression indicator side-by-side, you'll notice that the TSF hugs the prices more closely than the Linear Regression indicator.

Rather than plotting a straight Linear Regression trendline, the Time Series Forecast indicator plots the ending values of multiple Linear Regression trendlines. The resulting Time Series Forecast indicator is sometimes referred to as a "moving linear regression" study or a "regression oscillator."

References:

- For MetaStock plotting indicators, see page 237.
- For Time Series Forecast parameters, see page 275.

Interpretation

The interpretation of a Time Series Forecast is similar to a moving average. However, the Time Series Forecast indicator has two advantages over moving averages.

Unlike a moving average, a Time Series Forecast does not exhibit as much "delay." Since the indicator is "fitting" a line to the data points rather than averaging them, the Time Series line is more responsive to price changes.

As the name suggests, the indicator can be used to forecast the next period's price. This estimate is based on the trend of the security's prices over the period specified (e.g., 20 periods). If the trend continues, the last point of the trendline (the value of the Time Series Forecast) is forecasting the next period's price.

Tirone Levels

Tirone Levels are a series of horizontal lines that identify support and resistance levels. They were developed by John Tirone.

References:
- For drawing MetaStock line studies, see page 186.
- For Tirone Level parameters, see page 225.

Interpretation

Tirone Levels can be drawn using either the Midpoint 1/3-2/3 method or the Mean method. Both methods are intended to help you identify potential support and resistance levels based on the range of prices over a given time period. The interpretation of Tirone Levels is similar to Quadrant Lines (page 218).

Trade Volume Index

The Trade Volume Index (TVI) is designed to calculate on intraday securities with "minutes per bar" set to zero (i.e., a tick chart). It is calculated by adding each trade's volume to a cumulative total when the price ticks up by a specified amount, and subtracting the trade's volume when the price ticks down by a specified amount. It's based on the premise that trades taking place at the higher "ask" price are buy transactions (from market marker or specialist to trader) and trades at the lower "bid" price are sell transactions (from trader to market maker or specialist). The TVI oscillates around zero. Values above zero indicate net buying pressure, whereas values below zero indicate net selling pressure.

The TVI is similar to On Balance Volume, except the TVI continues to cumulate the volume (be it on the buy or sell side) if the price is unchanged. Tick charts (especially of stock prices) will often display trades at the bid or ask price for extended periods without changing (creating a flat spot). The TVI continues to assign the trade volume during these extended flat periods to either the buy or sell side (depending on its last price change). The On Balance Volume indicator only assigns volume when price changes occur. This works well for daily charts but not for tick charts.

MetaStock prompts you to enter the "Minimum Tick Value." The Minimum Tick Value controls when volume switches from the buy side to the sell side. If the absolute value of the uptick or downtick is less than the Minimum Tick Value, MetaStock will continue to assign the volume to the current side (i.e., buy or sell side). If the absolute value is greater than the Minimum Tick Value and the price changes direction, MetaStock will switch and begin assigning volume to the opposite side.

Although the TVI will plot on any chart, it was originally designed to analyze intraday *tick* charts. Therefore, you may want to use On Balance Volume for non-tick charts (i.e., 5-minute, hourly, daily, weekly, monthly). However, the TVI can be used with non-tick data by increasing the Minimum Tick Value. For example, you could set the Minimum Tick Value to a large value (e.g., 1, 2, 3, 4 points or more) on a daily stock chart. This produces a smoothing effect when compared to On Balance Volume. Volume will cumulate in the direction of the trend until the price reverses by the specified number of points from a previous trough or peak. When this occurs, volume will then begin to cumulate in the opposite direction.

References:
- For MetaStock plotting indicators, see page 237.
- For Trade Volume Index parameters, see page 275.

Interpretation

The TVI helps identify whether buyers or sellers are in control. If the TVI is trending up, it indicates that buyers are in control. If the TVI is trending down, it indicates that sellers are in control. If the TVI is above zero, it indicates that net buying has taken place over the time period displayed. If the TVI is below zero, it indicates that net selling has taken place over the time period displayed.

If a large number of trades are taking place at a specific price level (i.e., a flat spot forms on the tick chart) and the TVI is rising (falling), look for the price to break out on the upside (downside).

Trendlines

It's difficult, if not impossible, to provide information on a topic as complex and multifaceted as trendlines in the small area available here. The best source to learn about trendlines and chart patterns is the book *Technical Analysis of Stock Trends*, by Edwards and Magee (page 764).

References:
- For drawing MetaStock line studies, see page 186.
- For Trendline parameters, see page 226.

General

A trendline is a sloping line drawn between two prominent points on a chart. Rising trendlines are usually drawn between two troughs (low points) to illustrate price support while falling trendlines are usually drawn between two peaks (high points) to illustrate upside price resistance.

The consensus is that once a trend has been formed (two or more peaks/troughs have touched the trendline and reversed direction) it will remain intact until broken.

That sounds much more simplistic than it is! The goal is to analyze the current trend using trendlines and then either invest with the current trend until the trendline is broken, or wait for the trendline to be broken and then invest with the new (opposite) trend.

The following chart displays two trendlines. The first trendline is a "falling" trendline. Note how it is drawn between successive peaks in the price. The second trendline is rising. It is drawn between successive troughs.

One benefit of trendlines is they can help distinguish intuitive decisions ("I think it's time to sell...") from analytical decisions ("I will hold until the current rising trendline is broken"). Another benefit of trendlines is that they almost always keep you on the "right" side of the market. When using trendlines, it's difficult to hold a security for very long when prices fall just as it's hard to be short when prices rise— either way the trendline will be broken.

Trendline Angles

MetaStock provides two commands that deal with trendline angles: Gann Lines (page 213), and Trendline by Angle (page 228). The following discussion explains how these commands function and their differences.

There are basically two ways to quantify the angle of a line drawn on a chart. The first method is relative to the computer screen (or the piece of paper). If you draw a line at 45 degrees using a protractor on the screen, the line should rise by one inch for each inch it extends (runs) to the right. This 45-degree angle also could be expressed as a slope of 1:

$$\frac{\text{1 inch rise}}{\text{1 inch run}}$$

The Trendline by Angle commands work in this manner — relative to the computer screen. We say it is relative to the computer screen because we are discussing *inches*, not prices, on the screen. Regardless of how many days are displayed or what the x- and y-axes of the chart are set to, a 45 degree angle will slope up and to the right at 45 degrees relative to the computer screen.

A second way to quantify the angle of a line drawn on the chart is relative to the x- and y-axes of the chart itself.

A 45 degree angle relative to the x- and y-axes would rise one y-axis unit (point) for each x-axis unit (day) that the line extends (runs) to the right:

$$\frac{\text{1 inch rise}}{\text{1 period run}}$$

This is how Gann Lines are drawn: relative to the x- and y-axes of the chart. The difference between these two methods, i.e., relative to the screen (inches) or to the axes (points), is substantial.

Gann Lines specifically ask for the ratio, i.e., the periods (run) and the points (rise). If you enter 1 x 1, you will get a line that rises one point for each day it travels to the right. The line may or may not appear to rise at 45 degrees relative to the screen, depending on how many periods you have loaded and how the left scale (y-axis) is set.

If you want a 1 x 1 Gann Line to appear to rise at 45 degrees relative to the computer screen, you will have to use the X- and Y-Axis Parameters dialog (see page 119 and page 125) to manually adjust the x- and y-axis.

The Trendline by Angle command draws trendlines relative to the computer screen. Changing the x- and y-axes will have no effect on the angle of the trendline.

TRIX

TRIX displays the percent rate-of-change of a triple exponentially smoothed moving average of the security's closing price.

It is the 1-period percent change of an *x*-period exponential moving average of an *x*-period exponential moving average of an *x*-period exponential moving average of the closing price.

An article on the TRIX indicator appears in Volume One of *Technical Analysis of Stocks & Commodities* (TASC) magazine. The TRIX indicator presented in the TASC article uses a slightly different method to calculate the exponential moving averages and displays the 1-period change in "points multiplied by 1,000" (whereas MetaStock displays the change as a percentage).

References:
- For MetaStock plotting indicators, see page 237.
- For TRIX parameters, see page 276.
- For Exponential Moving Average calculation, see page 352.

Interpretation

The TRIX indicator oscillates around a zero line. Its triple exponential smoothing is designed to filter out "insignificant" cycles (i.e., those that are shorter than *x*-periods). Trades should be placed when the indicator changes direction. You also can plot a 9-period moving average of the TRIX to create a "signal" line (similar to the MACD indicator, page 345) and then buy when the TRIX rises above its signal line, and sell when it falls below its signal line.

Typical Price

The Typical Price indicator is calculated by adding the high, low, and closing prices together, and then dividing by three. The result is the average, or typical price.

$$\text{Typical Price} = \frac{\text{High} + \text{Low} + \text{Close}}{3}$$

References:
- For MetaStock plotting indicators, see page 237.
- For Typical Price parameters, see page 276.

Interpretation

The Typical Price indicator provides a simple, single-line chart of the day's average price. You may find it helpful when testing moving average penetration systems to display moving averages of the Typical Price indicator, rather than of the security's closing price.

Ultimate Oscillator

Oscillators typically compare a security's (smoothed) price with its price *x*-periods ago. Larry Williams notes that the value of this type of oscillator can vary greatly depending on the number of time periods used during the calculation. Thus, he developed the Ultimate Oscillator that uses weighted sums of three oscillators, each of which uses a different time period. The three oscillators are based on Williams' definitions of buying and selling "pressure."

References:
- For MetaStock plotting indicators, see page 237.
- For Ultimate Oscillator parameters, see page 276.

Interpretation

Williams recommends that you trade following a divergence and a breakout in the Ultimate Oscillator's trend. A bullish divergence occurs when the security's price makes a lower low that is not confirmed by a lower low in the Oscillator. A bearish divergence occurs when the security's price makes a higher high that is not confirmed by a higher high in the Oscillator.

Vertical Horizontal Filter

The Vertical Horizontal Filter (VHF) determines whether prices are in a trending phase or a congestion phase. The VHF compares the sum of a one period rate-of-change to the range between high and low prices over the specified period.

The age-old problem for many trading systems is their inability to determine if a trending or trading range market is at hand. Trend-following indicators such as MACD and moving averages, tend to be whipsawed as markets enter a non-trending congestion phase. On the other hand, oscillators (which work well during trading range markets) tend to overreact to price pull-backs during trending markets. The VHF indicator attempts to remedy this by measuring the "trendiness" of a market.

MetaStock prompts you to enter the number of periods to use in the calculation. The default value is 28.

References:
- For MetaStock plotting indicators, see page 237.
- For VHF parameters, see page 276.

Interpretation

There are three ways to use the VHF indicator:

- VHF values above or below certain levels indicate the degree of trending. The higher the VHF, the higher the degree of trending.
- The direction of the VHF can be used to determine whether a trending or congestion phase is developing. A rising VHF indicates a developing trend; a falling VHF indicates that prices may be entering a congestion phase.
- The VHF as a contrarian type indicator. Expect congestion to follow high VHF values. Low VHF values may indicate a trending phase will soon follow.

Volatility, Chaikin's

The Volatility indicator compares the spread between a security's high and low prices. This is done by first calculating a moving average of the difference between the daily high and low prices and then calculating the percent rate-of-change of that moving average.

Before calculating the Volatility indicator, you are asked to enter the number of time periods in the moving average and the number of time periods in the R.O.C. The author of this indicator (Marc Chaikin) recommends 10-periods for both the moving average and the R.O.C.

References:
- For MetaStock plotting indicators, see page 237.
- For Chaikin's Volatility indicator parameters, see page 277.

Interpretation

This indicator quantifies volatility as a widening of the range between the highs and the lows (i.e., wider price swings during the day).

There are two ways to interpret this measure of volatility. One method assumes that market tops are generally accompanied by increased volatility and that market bottoms are generally accompanied by decreased volatility. An opposing method (Mr. Chaikin's) assumes that an increase in the Volatility indicator over a short time period indicates that a bottom is near (e.g., a panic selloff) and that a decrease in volatility over a longer time period indicates an approaching top (e.g., a mature bull market).

Tips:
- Mr. Chaikin recommends that investors do not rely on any one indicator and suggests using a moving average penetration or trading band system to confirm this (or any) indicator.
- An example custom indicator (page 290) shows how to calculate Chaikin Volatility.

Note: Because this indicator uses high and low prices in its calculation, it will not work on securities that only have a closing price (e.g., most mutual funds).

Volume

Volume is the number of units (i.e., shares or contracts) traded during a specific time period. The analysis of volume is a basic yet very important element of technical analysis. Volume helps measure the intensity of price movement.

Often, the y-axis scale for volume is displayed in multiples of 10s or 100s rather than the actual number (i.e., 500 = 500,000 shares). If there is a scaling multiple, it will be displayed at the bottom of the y-axis scale. Volume is normally displayed in a histogram line style below the prices.

Some real-time data vendors do not provide volume with every tick. If this is the case, MetaStock will automatically assign a volume value of "1" for every incoming tick. This allows you to at least see the number of "ticks" that have come in during a specified period. In other words, if the volume on a 1-minute bar is 22, then you know that 22 trades came in during that minute.

If your real-time data vendor does not supply trade volume with updates, and a symbol is added during a trading session, the first tick will contain the total volume up to that point in the trading session. MetaStock will then calculate the trade volume for all subsequent ticks.

References:
- For MetaStock plotting indicators, see page 237.
- For Volume parameters, see page 277.

Interpretation

Volume is important to many techniques and systems used in technical analysis. In brief, volume provides clues to the intensity level of a given price move.

Generally speaking, volume tends to be a leading indicator of price. Volume usually drops off before prices peak, and it usually picks up before prices rise from a market bottom. Low volume levels are characteristic of the indecision that typically accompanies consolidation periods (i.e., periods where prices move sideways in a narrow range). Low volume is often found at market bottoms.

High volume levels are characteristic of market tops and the beginning of new trends (i.e., when prices break out of a trading range). Just prior to market bottoms, volume will often increase on panic driven selling.

Volume also helps determine the heAlth of an existing trend. A healthy uptrend should have higher volume on the upward legs of the trend, and lower volume on the downward, corrective legs. After a market top, it is common to have a sharp down day on very heavy volume. A healthy downtrend usually has higher volume on the downward legs of the trend and lower volume on the upward, corrective legs.

Volume Oscillator

The Volume Oscillator displays the difference between two moving averages of a security's volume. The difference between the averages can be expressed in either points or percentages.

References:
- For MetaStock plotting indicators, see page 237.
- For Volume Oscillator parameters, see page 474.

Interpretation

As volume levels are increasing, shorter-term volume moving averages will rise above longer-term volume moving averages. This is similar to how shorter-term price moving averages rise above longer-term price moving averages when prices are increasing.

Thus, the difference between two volume moving averages of varying lengths (i.e., this indicator) can be used to see if overall volume trends are increasing or decreasing. When the Volume Oscillator rises above zero, it signifies that the shorter-term volume moving average has risen above the longer-term volume moving average, or that the short-term volume trend is higher (i.e., more volume) than the longer-term volume trend.

There are many ways to interpret changes in volume trends. One common belief is that rising prices coupled with increased volume, and falling prices coupled with decreased volume, is bullish. Conversely, if volume increases when prices fall, and volume decreases when prices rise, the market is showing signs of underlying weakness.

The theory behind this is straight forward. Rising prices coupled with increased volume signifies increased upside participation (more buyers) that should lead to a continued move. Conversely, falling prices coupled with increased volume (more sellers signifies increased downside participation).

Tip:
- An example custom indicator (page 290) shows how to calculate the Volume Oscillator.

Volume Rate-Of-Change

The Volume Rate-Of-Change (R.O.C.) indicator is calculated by dividing the volume change over the last *x*-periods by the volume *x*-periods ago. The result is the percent by which the volume has changed over the last *x*-periods.

If volume is higher today than *x*-days ago, the R.O.C. will be a positive number. If volume is lower today then *x*-days ago, the R.O.C. will be negative.

References:
- For MetaStock plotting indicators, see page 237.
- For Volume R.O.C. parameters, see page 278.

Interpretation

The Volume R.O.C. is calculated identically to the Price R.O.C. (page 371), except it displays the R.O.C. of the security's volume, rather than of its closing price. Additional information on the interpretation of volume trends can be found in the discussion on the Volume Oscillator (page 409).

Tip:
- An example custom indicator (page 290) shows how to calculate Volume R.O.C.

Weighted Close

The Weighted Close indicator is calculated by multiplying the close by two, adding the high and the low, and dividing by four. The result is the average price for the day with extra weight given to the closing price.

$$\text{Weighted Close} = \frac{(\text{Close} \cdot 2) + \text{High} + \text{Low}}{4}$$

References:
- For MetaStock plotting indicators, see page 237.
- For Weighted Close parameters, see page 278.

Interpretation

The Weighted Close indicator provides a single line chart of the average price. When testing moving average penetration systems, you may find it helpful to display moving averages of the Weighted Close indicator, rather than of the security's closing price.

Tip:
- An example custom indicator (page 290) shows how to calculate Weighted Close.

Wilder's Smoothing

The Wilder's Smoothing indicator was developed by Welles Wilder, best known as the developer of the Directional Movement system (page 324) and the Relative Strength Index (page 384). Wilder used this smoothing indicator as a component of many of his other studies. It is basically a type of moving average, similar to the "exponential" method in that it retains a decreasingly smaller percentage of all historical data in the series.

References:
- For MetaStock plotting indicators, see page 237.
- For Wilder's Smoothing parameters, see page 279.
- For interpretation of moving averages, see page 262.

Interpretation

The Wilder's Smoothing indicator should be used just as you would use a moving average. Although similar to the exponential, weighted, and triangular moving average methods in how it has a "memory" of all historical data, the Wilder's Smoothing method seems to be the least responsive of the three.

Williams' %R

The formula used to calculate Williams' %R is similar to the Stochastic Oscillator (page 393):

Williams' %R is plotted on an upside down scale with 0 at the top and 100 at the bottom. To show the indicator in this upside down fashion, MetaStock places a minus symbol before the %R values. You should ignore the minus symbol.

References:
- For MetaStock plotting indicators, see page 237.
- For Williams' %R parameters, see page 279.

Interpretation

The analysis of Williams' %R is very similar to that of the Stochastic Oscillator (page 393) except that %R is upside down and the Stochastic Oscillator has internal smoothing.

Readings in the range of 80 to 100% (remember to ignore the minus symbol) indicate that the market is oversold, while readings in the 0 to 20% range suggest that the market is overbought.

As with all overbought/oversold indicators, it is best to wait for the security's price to change direction before placing your trades. For example, if an overbought/oversold indicator (such as the Stochastic Oscillator or Williams' %R) is showing an overbought condition, it is

wise to wait for the security's price to turn down before selling the security. (The MACD is a good indicator to monitor change in a security's price.) It is not unusual for overbought/oversold indicators to remain in an overbought/oversold condition for a long time period as the security's price continues to climb/fall. Selling simply because the security appears overbought may take you out of the security long before its price shows signs of deterioration.

An interesting phenomena of the %R indicator is its uncanny ability to anticipate a reversal in the underlying security's price. The indicator almost always forms a peak and turns down a few days before the security's price peaks and turns down. Likewise, %R usually creates a trough and turns up a few days before the security's price turns up.

Tip:
- An example custom indicator (page 290) shows how to calculate Williams' %R.

Williams' Accumulation/Distribution

Williams' Accumulation/Distribution is a cumulative total of "X" where:

```
TRH (true range of highs) =
Yesterday's close or today's high, whichever
is greater.

TRL (true range of lows) =
Yesterday's close or today's low, whichever is
less.
```

If today's close is greater than yesterday's close:

```
X =    today's close - TRL,
otherwise, if today's close is less than
yesterday's close,
X = today's close - TRH,
otherwise,
X = 0.
```

References:
- For MetaStock plotting indicators, see page 237.
- For Williams' Accumulation/Distribution parameters, see page 279.

Interpretation

Williams recommends trading this indicator based on divergences.

- Distribution of the security is indicated when the security is making a new high and the A/D indicator is failing to make a new high. Sell.
- Accumulation of the security is indicated when the security is making a new low and the A/D indicator is failing to make a new low. Buy.

Tips:
- Williams' Accumulation/Distribution indicator is a *price* indicator. The *Accumulation/Distribution* indicator is a *volume* indicator (page 277).
- An example custom indicator (page 290) shows how to calculate Williams' A/D.

Zig Zag

The Zig Zag indicator filters out changes in the data item (i.e., the security or an indicator) that are less than *x* percent or points. It is used primarily to aid in the visual inspection of a chart—punctuating the significant moves.

References:
- For MetaStock plotting indicators, see page 237.
- For Zig Zag parameters, see page 476.

Interpretation

The Zig Zag indicator is useful to filter out "noise" in a security's price and indicators. It is primarily intended to aid in the visual inspection of a chart.

The Zig Zag indicator can be useful for those concerned with Elliot Wave counts since it helps identify significant turning points.

Be forewarned, that the last leg (i.e., segment) of the Zig Zag is dynamic, meaning that it can change. Therefore, be careful when designing system tests, experts, etc. based on the Zig Zag indicator.

For additional information on the Zig Zag indicator, refer to *Filtered Waves* by Arthur Merrill (page 764).

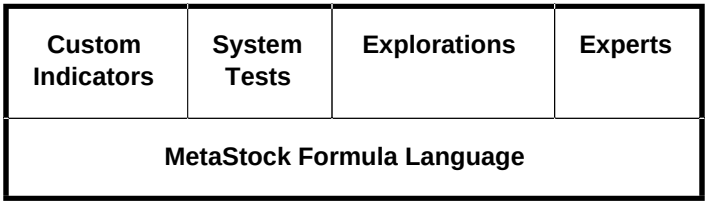
The MetaStock Formula Language

What is the MetaStock Formula Language?

The MetaStock formula language is a special programming language used to define and create custom indicators, system tests, explorations, and `experts`. It is patterned after popular spreadsheet languages.

In its simplest form, the MetaStock formula language is comprised of high-level functions (e.g., mov(), rsi(), abs()), mathematical operators (e.g., +, -, /, *), and parameters (open, high, low, close, etc.). Each of these basic components can be combined to create your own indicators with the Indicator Builder, backtest your trading ideas with the Enhanced System Tester, rank and filter your securities with The Explorer, and generate Chartx-Security feedback with the Expert Advisor.

In order to effectively use the Indicator Builder, Enhanced System Tester, Explorer, or Expert Advisor, you need to be familiar with the MetaStock formula language. The MetaStock formula language is the foundation and common link for each of these four tools.



The Indicator Builder will be used in this chapter to teach the MetaStock formula language. For specific tutorials on each of the four formula-related tools, refer to their specific chapters.

Price Array Identifiers

One of the most basic building blocks of a formula is called a price array identifier. A price array identifier "identifies" specific price fields that the formula should operate on. The valid price array identifiers are open, high, low, close, volume, open interest, and indicator.

Price array identifiers can be abbreviated as shown in the following table. Note that these are *not* case-specific.

Long Name	Abbreviation
Open	O
High	H
Low	L
Close	C
Volume	V
Open Interest	OI
Indicator	P
Previous Value	PREV

Examples of the use of price array identifiers in formulas are shown below. The actual price array identifier component of the formulas are in **bold** for these examples.

```
mov( close,10, simple )
if (h > ref(h,-1), mov(h,20,s), mov(c,20,s) )
stdev( volume, 20 )
```

Mathematical Operators

Mathematical operators are the "glue" that binds formulas. Formulas can contain the following mathematical operators. (They also can contain advanced operators such as square root, as explained later.)

- **+** Addition
- **-** Subtraction (or negative)
- ***** Multiplication
- **/** Division

These formulas illustrate the use of operators (**bolded**) in a formula:

```
( H + L ) / 2
mov(c,10,s)-mov(c,20,s) / (h + l + c)
close + ((1.02 * high)-high)
```

Operator Precedence

Parentheses were used in many of the preceding formulas in this chapter to control the operation precedence (the order in which the operators are calculated). MetaStock always does operations within the innermost parentheses first. When parentheses are not used, the precedence is as follows:

`-`	Negative values
`*`	Multiplication
`/`	Division
`+`	Addition
`-`	Subtraction
`<`	Less than
`>`	Greater than
`<=`	Less than or equal to
`>=`	Greater than or equal to
`=`	Equal to
`<>`	Not equal to
`And`	Logical “And”
`Or`	Logical “Or”
`:=`	Variable assignment operator

The expression “`H + L / 2`” (without parenthesis) would be calculated by MetaStock as “`L / 2`” plus “`H`” since division has a higher precedence. This would result in a much different value than “`(H + L) / 2`”.

For ease of reading, we recommend that you always use parenthesis to control precedence.

Formula Functions

In addition to the four mathematical operators, MetaStock contains over 200 “functions” that perform mathematical operations.
For a complete listing of all built-in functions, see page 436.

The following formula consists of a single function that plots the square roots of the closing prices. The names of the actual functions in the following examples are in bold.

```
sqrt( CLOSE )
```

The following formula consists of a single function that plots a 14-period RSI indicator.

```
rsi(14)
```

The following formula consists of a single function that plots a 10-period simple moving average.

```
mov(c,10,s)
```

The following formula consists of two functions. The result is the difference between the MACD indicator and a 9-period exponential moving average of the MACD.

```
macd()- mov(macd(),9,exponential)
```

As you've probably noticed, this syntax is very similar to the syntax used to enter formulas in spreadsheets.

IMPORTANT: All functions *must* be followed by a pair of parentheses. If an opening parenthesis is not the first character after a function name, an error message will be displayed.

Function Parameters

Parameters provide a function the necessary information required to calculate. For example, the sqrt() function requires a single "parameter" within the parentheses, while some (such as macd()), do not require any parameters. Others, like the Volume Oscillator (page 474) require four parameters.

The following formula calculates a 14-period Money Flow Index. The actual parameters are in **bold** in the following examples.

```
mfi(14)
```

Some functions require multiple parameters within the parentheses. For example, the moving average function (shown below) requires three parameters.

```
mov(rsi(14),30,simple)
```

In the above formula, the parameters instruct MetaStock to calculate a 30-period simple moving average of a 14-period RSI. Notice that another function (i.e., rsi(14)) serves as one of the parameters.

Note: If you forget to insert the proper parameter, MetaStock will display a window reminding you of the expected parameter.

Locating Errors in Formulas

MetaStock does an excellent job of reporting errors in formulas. In fact, it is impossible to enter an invalid formula. This doesn't mean your formulas will always work as you expect them to, because MetaStock does not know what you are trying to create. However, it does mean that the *syntax* of the formula (e.g., function names, parameters, operators, parentheses, etc.) will always be valid.

When you enter a formula, MetaStock tests the formula's syntax. If an error is found, the formula will be redisplayed, the cursor will be positioned at the error location, and a message explaining the error will be displayed.

The effect of this error-reporting technique is that MetaStock helps you enter valid formulas. This is illustrated in the following example.

Suppose you want to plot a formula containing a 10-period exponential moving average of the closing price and all you can remember is that the moving average function is "mov" (see page 286 if you don't remember a function name).

1. Enter what you do know in the Formula box of the Indicator Editor dialog (page 284):
   `mov`

   and click the **OK** button.

   The cursor will be positioned after the "mov" function name and the message "A '(' must immediately follow a function name" will be displayed.
2. Now add an opening parenthesis:
   `mov(`

   and click **OK**.

   This time, the cursor will be positioned after the "(" and the message "Price array (e.g., HIGH, LOW, CLOSE, etc.) or function expected" will be displayed.
3. Enter the price array identifier "*CLOSE*."
   `mov(CLOSE)`

   and click **OK**.

If you continue this process (i.e., enter partial formulas and then respond to the error message), MetaStock will prompt you through the formula entry process until the formula's syntax is correct (shown below).

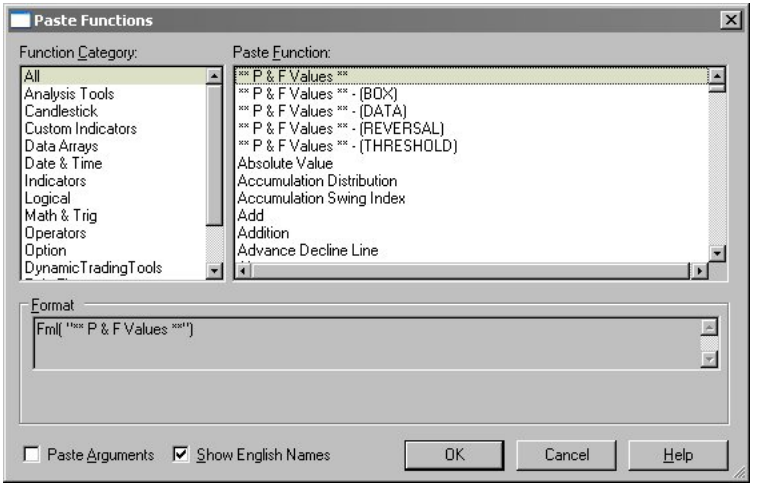
```
mov(CLOSE,10,EXPONENTIAL)
```

This is a valuable technique! Any time you are not sure of the syntax of a formula or function, click **OK**.

Inserting Functions

The preceding section explained how MetaStock helps you correct syntax errors within formulas. This section explains how MetaStock can help you remember (and enter) the 200+ functions.

Clicking the **Functions** button while editing a formula displays the Paste Functions dialog. This dialog lists the categories of the available functions on the left-hand side and the function names within the category on the right-hand side.



Exploring the Paste Functions dialog is an excellent way to learn more about formulas.

Clicking **OK** when the Paste Functions dialog is displayed will insert the function that is currently highlighted into your formula (at the location of the cursor). The function can be inserted with a description of the required arguments (if required) by checking the Paste Arguments checkbox. The list on the right side of the dialog can display the actual function names or the English names of the functions by checking/unchecking the Show English Names checkbox.

For more information on pasting functions into formulas, see page 286.

Writing Comments

When writing long, complex formulas, it is helpful to make comments throughout the formula to describe what is going on. Experienced programmers will attest to the fact that the prudent use of comments makes programming code much easier to debug and work with.

Comments can be entered in a formula by surrounding them with "{" and "}" braces. The following formula contains two comments (shown in **bold**).

```
macd() {the MACD times} * ((H+L+C) / 3) {the
average price}
```

Caution: Placing comments within comments will cause an error message to be displayed.

Nesting Functions

As has been eluded to in earlier examples, a function can be "nested" within a function. The nested function can serve as the main function's data array parameter. The following examples show functions nested within functions. The nested functions are in **bold**.

```
stdev( stoch(5,3), 10 )
mov( rsi(15), 10, SIMPLE)
mov( mov( rsi(15), 20, W), 10, SIMPLE)
```

- The first example calculates a stochastic oscillator and then calculates a 10-period standard deviation of the stochastic oscillator.
- The second example calculates a 10-period simple moving average of a 15-period Relative Strength Index (RSI).
- The third example calculates a 20-period weighted moving average of a 15-period RSI, and then calculates a 10-period simple moving average of this moving average.

This technique (placing functions within functions) is referred to as the "nesting of functions."

The if() function

The if() function is used to create conditional (i.e., "if-then") statements. It is perhaps the most used function in the MetaStock formula language. It contains three parameters as shown in the following example.

```
if( close > mov(c,10,s), rsi(9), rsi(14) )
```

The above "if" statement reads (in English) as follows: "If today's close is greater than today's 10-day simple moving average of the close, then plot a 9-day RSI, otherwise, plot a 14-day RSI."

The next formula plots "positive volume" if the close is greater than the median price. Otherwise, "negative volume" is plotted.

```
if( CLOSE > (HIGH+LOW)/2, +V, -V )
```

A good example of the if() function can be found in the "On Balance Volume" example (page 291).

If you simply want an expression to be evaluated as either true or false, it can be done without the use of the if() function.
The following formula will result in either a 1 (true) or a 0 (false).

```
rsi(14) > 70
```

If the 14-period RSI is greater than 70, then this formula will evaluate to "true" and return the number 1. If it is below 70, the formula will evaluate to "false" and return the number 0. This is done without the if() function being used. The formula below uses the if() function and will return the same results, but it is longer.

```
if(rsi(14) > 70, 1, 0 )
```

Using "And" and "Or" Operators

If a formula requires multiple conditions, you can combine the conditions with "and" and "or" operators. For example, maybe you'd like to plot a +1 when the MACD is greater than zero ***and*** the RSI is greater than 70. The formula could be written two ways:

```
macd() > 0 AND rsi(14) > 70
```

or

```
if(macd() > 0 and rsi(14) > 70, +1, 0)
```

You can add as many conditions within a formula as space allows. For example:

```
If(macd() > 0 AND rsi(14) > 70 AND CCI(14) >
100 AND close > mov(close,10,e), +1, 0)
```

You can even combine AND and OR operators within the same formula as follows:

```
If((macd() > 0 OR close > mov(close,10,e)) AND
rsi(14) > 70, +1, 0)
```

The formula above says to plot a "+1" if either the MACD is greater than zero or the close is above its moving average, and the RSI is greater than 70.

Notice that parentheses were placed around the OR condition because precedence specifies that the AND condition be evaluated first (page 417). If the parentheses were not placed around the OR condition, the moving average and the RSI would have been grouped together with the AND condition, which is not how we want the formula evaluated.

Referencing Existing Custom Indicators

You can reference other custom indicators using the fml() function (page 446). For example, the function "`fml( "My MACD")`" is the value of the formula that contains the text "My MACD" in its name. The entire name is not required— only enough of the name to make it unique. However, preference is given to the formula name that exactly matches. So if another formula named "MyMACD2" existed, "MyMACD" would be used since it matches exactly.

The following formula plots the value of the formula named "Down Day" if the close is less-than-or-equal-to a 10-period exponential moving average of the closing prices. Otherwise, it plots the value of the formula named "Up Day."

```
if( close <= mov(close, 10, E),
fml("Down Day"), fml("Up Day") )
```

This technique (referencing formulas from within formulas) is referred to as the "nesting of formulas." Using nested formulas is an excellent way to simplify long and/or complex formulas.

Notes:

- Nested formulas may reference nested formulas that reference nested formulas (etc.). However, circular references (Example: formula "My MACD" calls formula "My RSI" that calls formula "My MACD") will cause an error message to be displayed when the formula is plotted.
- If a multiplot formula is referenced, only the value of last plot in the multiplot formula is returned.
- If you need to reference the value of a specific variable in a custom indicator rather than the value of the custom indicator itself, use the fmlvar() function (page 428 and page 447).

Referencing Securities with the Security Data Function

The Security Data function allows a formula to access price data for any online or local security. This function can be used in any of MetaStock's formula tools.

Online securities are referenced by including "`ONLINE:`" before the symbol. Local securities are referenced by including the full path to the security file. If the security exists in the same folder as the base security, the path does not need to be included. The symbol, including the path or online reference, is enclosed in quotation marks.

To reference Microsoft's close as an online security

```
Security("ONLINE:MSFT",C)
```

To reference Microsoft's close as a local security using the full path

```
Security("C:\MetaStock Data\Sample\MSFT",C)
```

To reference Microsoft's close as a local security in the same folder as the base security

```
Security("MSFT",C)
```

The last type of reference is particularly useful if you use local data exclusively, and store all of your securities in the same local data folder.

For example, the following indicator displays a 30-day moving average of Microsoft's close on any chart, if your online data vendor is active.

```
Mov(Security("ONLINE:MSFT",C),30,S)
```

The same formula could be written as:

```
Security("ONLINE:MSFT",Mov(C,30,S))
```

Performance Tips

- Use Tick or 1-minute data for optimum results when plotting an indicator on a chart which references online intraday securities. Intervals higher than 1-minute must be compressed before the indicator can be recalculated, which slows calculation time.
- The Live Bars option found on the Real-time page of Application Properties (page 41) causes all indicators on a chart to recalculate with each incoming tick. The Security Data function is particularly slow when this option is enabled. Disabling this option will cause all indicators, including the Security Data function, to recalculate only when the full bar has been completed.
- Retrieving data from an online source is slower than referencing data in a local data file. Any formula using the Security Data function to access online data will take longer to calculate than when accessing only local data.

Using Variables to Enhance and Simplify

In order to shorten, simplify, enhance, and make the maintenance of complex formulas easier, you may want to use variables. A variable is an alphanumeric name (up to 20 characters) that is assigned to an expression or a single value. Up to 20 variables can be used in a formula. Variables must be assigned before the variable is used in the formula. A semi-colon must be used at the end of the variable assignment line. Variables cannot be assigned within a function.

Naming of Variables

The following rules apply to the naming of variables:

- Variable names cannot contain commas, parenthesis, spaces, underscores, etc.
- Variable names cannot duplicate names already used by functions (e.g., mov, rsi, cci, if, etc.).
- A variable cannot be assigned a name that matches the parameters reserved for use in formulas (e.g., open, high, low, close, simple, o, c, l, h, s, e, w, etc.).

  The following would produce an error, since the letter "s" is reserved for the moving average function, mov(), to mean "simple."

  ```
  s:= (h+l+c)/3;
  ```

- Variable names must contain at least one alpha letter (e.g., T1234).
- Variable names are **not** case sensitive (e.g., "PERIODS" is the same as "periods").

Using Variables to Represent Numbers

Suppose you would like to be able to quickly adjust the time periods throughout a formula without having to edit each use of the time periods individually. This could be accomplished by assigning the time periods to a variable—in this case, a variable named "periods".

```
periods := 10;
c > mov(c,periods, s) and ref(c,-1) >
ref(mov(c,periods,s),-1) and h >
mov(h,periods,s) and ref(h,-1) >
ref(mov(h,periods,s),-1)
```

In the above formula, the number "10" will be substituted wherever the variable named "periods" appears in the formula. When you want to adjust the time periods in this formula, simply edit the number

assigned to the “periods” variable. If you change “10” to “20,” the number “20” will be substituted throughout the formula.

Of course, you could also assign multiple variables to represent multiple numbers as follows:

```
periods1 := 10;
periods2 := 20;
c > mov(c,periods1, s) and ref(c,-1) >
ref(mov(c,periods1,s),-1) and h >
mov(h,periods2,s) and ref(h,-1) >
ref(mov(h,periods2,s),-1)
```

In this case, the variables “periods1” and “periods2” represent two different values that can be used as many times as desired throughout the formula.

Using Variables to Represent Mathematical Expressions

Variables can be assigned to represent a mathematical expression (i.e., formula). Perhaps this is the most useful benefit of variables. Assigning variables to represent formulas (especially long, complex ones) makes formulas easier to read, easier to modify, and faster to calculate.

For example, the following formula (designed to spot securities locked between support and resistance levels), is quite complex and difficult to read. It can be simplified by using variables. It was originally written before variable support was added to MetaStock’s formula language.

```
(If(Abs((Trough(1,L,1)-Trough(2,L,1))/
Trough(2,L,1))<.015
AND
Abs((Trough(2,L,1)-Trough(3,L,1))/
Trough(3,L,1))<.015,{then}
(Trough(1,L,1)+Trough(2,L,1)+Trough(3,L,1))/
3,0))<>0
AND
(If(Abs((Peak(1,H,1)-Peak(2,H,1))/
Peak(2,H,1))<.015
AND
Abs((Peak(2,H,1)-Peak(3,H,1))/
Peak(3,H,1))<.015,{then}
(Peak(1,H,1)+Peak(2,H,1)+Peak(3,H,1))/3,0))
<>0
AND
c>=(If(Abs((Trough(1,L,1)-Trough(2,L,1))/
Trough(2,L,1))<.015
AND
```

```
Abs((Trough(2,L,1)-trough(3,L,1))/
Trough(3,L,1))<.015,{then}
(Trough(1,L,1)+Trough(2,L,1)+Trough(3,L,1))/
3,0))
AND
c<=(If(Abs((Peak(1,H,1)-Peak(2,H,1))/
Peak(2,H,1))<.015
AND
Abs((Peak(2,H,1)-Peak(3,H,1))/Peak(3,H,1))
<.015,{then}
(Peak(1,H,1)+Peak(2,H,1)+Peak(3,H,1))/3,0)
```

By defining two variables (in **bold**) to represent the two expressions that are used repeatedly, you can simplify the formula substantially. In addition to being easier to read, the simplified formula also calculates quicker since the support and resistance expressions now only need to calculate once.

```
Support:=
(If(Abs((Trough(1,L,1)-trough(2,L,1))/
Trough(2,L,1))<.015
AND
Abs((Trough(2,L,1)-trough(3,L,1))/
Trough(3,L,1))<.015,{then}
(Trough(1,L,1)+Trough(2,L,1)+Trough(3,L,1))/
3,0));

Resistance:=
(If(Abs((Peak(1,H,1)-Peak(2,H,1))/Peak
(2,H,1))<.015
AND
Abs((Peak(2,H,1)-Peak(3,H,1))/Peak(3,H,1))
<.015,
{then}(Peak(1,H,1)+Peak(2,H,1)+Peak(3,H,1))/
3,0));

Support <> 0 and Resistance <> 0 and close >=
Support and close <= Resistance
```

Notice that you could also create individual custom indicators named “support” and “resistance” to do the calculations (see page 446 for more information on using the fml() function). These custom indicators could then be called using the fml() function as follows:

```
fml("support") <> 0 and fml("resistance") <> 0
and close >= fml("support") and close <=
fml("resistance")
```

However, using variables is generally more desirable than using the fml() function for several reasons—the most important being calculation speed and self-containment (i.e., the entire function can be read and edited in one place).

Referencing Variables within Custom Indicators

Since custom indicators can contain variables, you can reference a specific variable within a custom indicator rather than the entire custom indicator. The `fmlvar()` function is used to do this. For example, if the custom indicator named "MyMACD" contains a variable named "SignalLine," and you only want to reference the SignalLine variable, it could be done as follows using the `fmlvar()` function:

```
fmlvar("MyMACD", "SignalLine" )
```

Note: If the variable does not exist within the custom indicator, you will receive an error message.

References:

- For more information on using variables within formulas, see page 425.
- For more information on the `fmlvar()` function, see page 428 or page 447.

Self Referencing Formulas Using PREV

The PREV constant allows you to create self-referencing formulas. A self referencing formula is one that is able to reference the "previous" period's value of itself.

For example, the following is an example of a self referencing formula:

```
((H+L+C)/3) + PREV
```

This simple formula divides the high, low, and closing prices by 3 and then adds this value to yesterday's value of the `((H+L+C)/3)`.

The calculation of the popular indicator On Balance Volume illustrates the use of the PREV function.

```
(if(c>ref(c,-1),1,-1)*volume)+PREV
```

Although On Balance Volume can be calculated without the use of the PREV function, an exponential moving average cannot (other than using the mov() function). The following formula shows how a 18% exponential moving average (approximately 10-periods) is calculated using the PREV function.

```
(close*0.18)+(PREV*0.82)
```

Self-Referencing Formula Calculations

You are using the PREV variable in a location within a custom indicator that will cause the calculation to be very slow. You should normally try to avoid using the PREV variable as a DATA ARRAY when there is also a PERIODS specified (e.g., `mov(prev, 20, s)`, `hhv(prev, 30)`, etc.). Although use of the PREV function in this way is allowable, it will take a long time to calculate, particularly if a lot of data is loaded in the chart.

The “P” Data Array Identifier

A special data array identifier (i.e., “P” variable) is used to reference any indicator or price plot. With custom indicators, the “P” variable represents the plot the custom indicator is dropped on.

With system tests and explorations, the “P” variable represents the selected plot. This may be useful if you want an indicator, exploration, system test, or expert to calculate on a plot other than the chart’s base security.

If you drop a custom indicator containing the “P” variable on high/low/close price bars, the close is used for the “P” variable. For example, the following custom indicator plots an “MACD-type” indicator (i.e., the difference between 12- and 26-period exponential moving averages) of the plot it is dropped on.

```
mov( P, 12, E) - mov( P, 26, E)
```

If you plot the predefined Accumulation/Distribution indicator and then drop the above custom indicator on it from the QuickList, the result will be an MACD of the Accumulation/Distribution indicator.

Of course, you could write the preceding formula without using the “P” identifier as shown below, but you would have to modify it if you wanted an MACD of an indicator other than the Accumulation/ Distribution. By using the “P” identifier, the formula becomes more versatile.

```
mov( ad(), 12, E) - mov( ad(), 26, E)
```

In a custom indicator, the values for HIGH, LOW, CLOSE, VOLUME, OPEN, and OPEN INTEREST *always* come from the base security. For example, if you drop the custom indicator “`HIGH - LOW / P`” on a price plot that is *not* the chart’s base security, the HIGH and LOW values will still come from the base security. The “P” value will represent the CLOSE of the security it was dropped on.

To plot a custom indicator with the “P” variable

1. Write a custom indicator using the “P” variable in place of the data array identifier (e.g., `mov(p,10,e)`, `sum(p,25)`, `stdev(p,12)`, etc.).
2. Drag the custom indicator from the QuickList and drop it on the plot you want the “P” variable to calculate on.

To run a system test, exploration, or expert that contains a "P" variable

1. Write a system test, exploration, or expert using the "P" variable in place of the data array identifier (e.g., `mov(p,10,e)`, `sum(p,25)`, `stdev(p,12)`, etc.).
2. Select the plot (i.e., indicator or price plot) to use for the "P" variable by clicking directly on the plot. The plot is selected when small square "handles" appear on the plot.
3. Run the system test or exploration.

Formula Tips

General

The two most important "formula tips" have already been mentioned:
(1) use the Paste Formula dialog (page 420) and
(2) click **OK** when entering a formula to check its syntax (page 419).

Multiple Indented Lines

When writing long custom indicators, you should try to use multiple lines and consistent indentation for ease of reading. You can indent a line of the formula by typing CTRL+TAB. For example, the formula

```
cum(if(close > ref(close,-1),+V, if(close < ref(close,-1),-V,0)))
```

is easier to read on multiple indented lines as follows:

```
cum(
        if(close > ref(close,-1),
                +v,
        if(close < ref(close,-1),
                -v,
        0))
```

Upper versus Lower-case Characters

The case used when entering formulas does not matter (that is, "c" and "C" are treated the same). When MetaStock checks for syntax errors, it automatically modifies the case to make the formula easier to read. The case within comments is not altered.

Comments

The prudent use of comments makes formulas easier to read. (Remember, comments are any text enclosed in braces: {COMMENT}.)

You can use comments while developing formulas to "comment out" sections of the formula. For example, the second half of the following formula has been commented out so the first half can be tested. After the first half of the formula has been tested, you can remove the comments and test the entire formula.

```
( mov(fml("MA1"),10,S) / fml("MA2") )
{ * stoch(5,3) }
```

Variables

Use variables to speed up the calculation of formulas. Rather than repeating an expression or formula over and over, assign it to a variable and then reference the variable.

Spacing

Blank spaces within formulas are optional. However, the prudent use of spaces can make formulas easier to read.

Clipboard Commands

You can use the standard clipboard command accelerator keys while editing custom indicators to transfer formulas from one custom indicator to another. To copy the highlighted text, press CTRL+C; to cut, press CTRL+X; to paste, press CTRL+V.

Using the Formula Organizer to Import and Export

The Formula Organizer is a wizard that allows you to import and export any MetaStock formula-based files including custom indicators, system tests, explorations, and experts. For example, you can use the Formula Organizer to import a set of add-on custom indicators, experts, etc. purchased from a third party. You could also create a set of add-on indicators, explorations, etc. to distribute to your colleagues, and even protect your formulas with a password.

Starting with your custom indicators, the Formula Organizer wizard will walk you through the steps necessary to import and/or export your files. To protect your formulas with a password, choose the export option, then enter a password when prompted.

To import or export custom indicators, system tests, explorations, and experts

1. Run MetaStock.
2. Choose Indicator Builder from the Tools menu.
3. Click the **Organize** button to launch the Formula Organizer Wizard.
4. Follow the on-screen instructions.

Glossary

This glossary defines the terms used with the MetaStock formula language. Understanding (or remembering) these terms is not required, however, adding these terms to your vocabulary will make discussion easier with other MetaStock analysts.

Comment: Text within a formula that is not part of the formula. A comment must be surrounded by the characters `{` and `}`.

Constant: A specific type of parameter that is required by a function. Constants can be subdivided into the following groups:

- **Calculation Method Constant:** Used to define the mode of calculation.
  Defined as PERCENT or POINTS. (PERCENT and POINTS can be abbreviated to **%** or **$**.)
- **Comparison Constant:** Used in the if() function (page 422) to define the comparison operation.
  Defined by >, >=, <, <=, <>, or =.
- **Formula Constant:** Used within the fml() function to reference another formula. A formula constant is specified as the name of another formula enclosed in quotation marks (e.g.,`fml( "My Formula" )`).
- **Moving Average Type Constant:** Used to define the moving average calculation method.
  Defined as EXPONENTIAL, SIMPLE, TIME SERIES, TRIANGULAR, VARIABLE, or WEIGHTED.
  These can be abbreviated as E, S, T, TRI, VAR, and W.
- **Numeric Constant:** A single numeric value. A function requiring a numeric constant cannot accept a data array since a data array may contain multiple, rather than single, numeric values. An example of a numeric constant is the “10” in the formula “`mov(C,10,E)`.”

Data Array: A data array defines a specific set of information (data) that is used within a formula. Data arrays can be subdivided into more specific definitions:

Function Result Array: A data array that is created as the result of the execution of a function.

Literal Array: A data array defined using a single numeric constant.

Price Array: An array containing the information stored in the high, low, close, etc., data arrays.

Formula: A combination of comments, constants, functions, mathematical operators and/or price array identifiers.

Function: A pre-defined mathematical operation that can be performed on a set of parameters to produce a desired data array.

Operator, Mathematical: The +, -, *, and / operators.

Operator, Logical: The <, >, <=, >=, =, <>, AND, and OR operators.

Parameter: An item contained within a function. When a function has multiple parameters, they are separated by commas.

Precedence: The order in which a formula is evaluated (page 417).

Price Array Identifiers: The letters or words used to reference price arrays (Open, High, Low, Close, Volume, Open Interest, PREV, and the selected Plot).

Error Messages

Most of the error messages that are displayed when you enter and plot custom indicators are self-explanatory. This section clarifies some of the more common error messages.

A reference to a formula name is no longer valid.

This error occurs when a formula is plotted containing a reference (Example: `fml()`) to a nonexistent formula name.

Does not contain an executable formula.

An attempt was made to execute a custom indicator that does not contain a valid formula.

Formula too complex.

This error is caused by functions (not formulas) being nested too deeply or by a complex mathematical expression that uses numerous mathematical operators that are not grouped using parentheses.

Grouping operators with parentheses may fix this problem. However, a better solution is to split the too-complex formula into smaller formulas and then nest the smaller formulas using the fml() function (page 446).

Insufficient memory to continue formula execution.

MetaStock ran out of memory to store temporary values.

These can be alleviated by reducing the number of periods of data currently loaded or by reducing references to nested formulas.

Overflow in function.

The result of a formula calculation generated a value that was too large to store. The formula must be modified to produce

results with smaller values (e.g., divide certain data arrays or function results by 100).

Too many numeric constants defined in formula.

A maximum of 20 different numeric constants (page 433) may be used in each formula.

This error can be eliminated by splitting the formula that received the error into smaller formulas and then nesting the smaller formulas using the fml() function (page 446).

Value out of valid range in function.

A parameter in a function is invalid.

Examples:

- The formula `mov(C, -5, E)` will always generate this message, because -5 is not a valid moving average time period.
- The formula `mov(C, 200, E)` will generate this message if fewer than 200 time periods of data are loaded.
- The formula `mov(macd(), 74, E)` will generate this message if fewer than 100 time periods are loaded. This is because the MACD does not plot until the 26th day, which leaves fewer than 74 periods to calculate a 74-day moving average.

You should edit the formula and change the invalid parameter, or load more time periods.

Functions

The following list of functions can be used to create custom indicators (page 417), explorations (page 417), system tests (page 417), and experts (page 417).

For information on Candlestick functions, page 417.

Some of the pattern finding functions (i.e., Inside, Outside, Rally, and Reaction) are based on information provided in the pamphlet *Using the Volume Reversal Survey in Market Analysis* by Mark A. Leibovit (page 764).

Simulation Functions

These functions let you use values that occur in a system test simulation to determine rules for buying and selling. For example, if you want the simulation to place a Sell Order when the equity dips below 5,000, you could write:

```
if(Simulation.AccountCash < 5000,1,0)
```

Note: These functions only work in the Buy Order, Sell Order, Sell Short Order and Buy to Cover Order rules in the Enhanced System Tester Dialog. Also, the Current Position simulation functions only work in the Sell Order and Buy to Cover rules.

For explanations of what each simulation represents, check the Show English Names box at the bottom of the Paste Functions dialog.

Standard Functions

Absolute Value

SYNTAX `abs( DATA ARRAY )`

FUNCTION Calculates the absolute value of the DATA ARRAY.

EXAMPLE The formula "`abs( -10 )`" will return +10; the formula "`abs( 10 )`" also returns +10.

Accumulation/Distribution

SYNTAX `ad()`

FUNCTION Calculates the predefined Accumulation/ Distribution indicator.

Accumulation Swing Index

SYNTAX `aswing( LIMIT MOVE )`

FUNCTION Calculates the predefined Accumulation Swing Index. The Swing Index requires opening prices.

EXAMPLE `aswing( 3.0 )`

SEE ALSO The swing() function (page 470)

Addition

SYNTAX `add( DATA ARRAY, DATA ARRAY )`

FUNCTION Adds the two parameters together.

EXAMPLE The formula "`add( H, 10.7 )`" adds 10.7 to the high prices (this formula also could be written as "`H + 10.7`").

SEE ALSO The sub() function (page 469)

Alert

SYNTAX `alert( EXPRESSION, PERIODS )`

FUNCTION Extends a "true" result of EXPRESSION for the specified number of periods. This true result is held true over the number of periods specified even if a "false" result is generated.

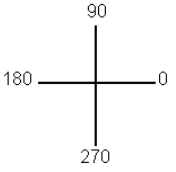
EXAMPLE `alert( cross(rsi(14),70),5 )`

SEE ALSO Using the Alert function within a system test (page 544)

Arc Tangent

SYNTAX `atan( Y DATA ARRAY, X DATA ARRAY )`

FUNCTION Returns the arc tangent of Y/X. The value is returned in degrees from 0 to 359.9. The degrees are returned as shown below:



EXAMPLE The formula "`atan( 10, 0 )`" returns 90.

SEE ALSO The cos() function (page 441)
The sin() function (page 468)

Aroon Down

SYNTAX `aroondown( PERIODS )`

FUNCTION Calculates the Aroon Down component of the Aroon indicator.

EXAMPLE `aroondown( 14 )`

Aroon Up

SYNTAX `aroonup( PERIODS )`

FUNCTION Calculates the Aroon Up component of the Aroon indicator.

EXAMPLE `aroonup( 14 )`

Average Directional Movement

SYNTAX `adx( PERIODS )`

FUNCTION Calculates the predefined Average Directional Movement indicator.

EXAMPLE `adx( 14 )`

SEE ALSO The adxr() function (page 443)
The csi() function (page 440)
The dx() function (page 443)
The mdi() function (page 457)
The pdi() function (page 461)

Average True Range

SYNTAX `atr( PERIODS )`

FUNCTION Calculates the predefined Average True Range indicator.

EXAMPLE `atr( 20 )`

Bars Since

SYNTAX `barssince( DATA ARRAY )`

FUNCTION Calculates the number of bars (time periods) that have passed since DATA ARRAY was true.

EXAMPLE `barssince( macd() < 0 )`

IMPORTANT: When using the `barssince()` function in an exploration, you must click the **Load ___ Records** button in The Explorer Options dialog (page 556) and specify a value equal to the number of bars loaded in your chart; otherwise, the exploration results may not be accurate.

Bollinger Band Bottom

SYNTAX `bbandbot( DATA ARRAY, PERIODS, METHOD, DEVIATIONS )`

FUNCTION Calculates the bottom Bollinger Band of DATA ARRAY using METHOD calculation method and Shifted downward DEVIATION standard deviations. Valid methods are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE. These can be abbreviated as E, S, T, TRI, VAR, and W.

EXAMPLE `bbandbot( close, 10, S, 2 )`

Bollinger Band Top

SYNTAX `bbandtop( DATA ARRAY, PERIODS, METHOD, DEVIATIONS )`

FUNCTION Calculates the top Bollinger Band of DATA ARRAY using METHOD calculation method and Shifted upward DEVIATION standard deviations. Valid methods are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE. These can be abbreviated as E, S, T, TRI, VAR, and W.

EXAMPLE `bbandtop( close, 10, S, 2 )`

Buying Pressure

SYNTAX `buyp()`

FUNCTION Calculates the buying pressure component of the Demand Index (page 443). Buying pressure is a measurement of the amount of volume related to buying.

Ceiling

SYNTAX `ceiling( DATA ARRAY )`

FUNCTION Calculates the lowest integer that is greater than DATA ARRAY.

EXAMPLE The formula "`ceiling( 7.2 )`" returns 8; the formula "`ceiling(-7.2)`" returns -7.

SEE ALSO The floor() function (page 446)
The int() function (page 452)

Chaikin A/D Oscillator

SYNTAX `co()`

FUNCTION Calculates the predefined Chaikin Oscillator.

Chaikin's Money Flow

SYNTAX `cmf( PERIODS )`

FUNCTION Calculates the predefined Chaikin Money Flow indicator over the last PERIOD number of periods.

EXAMPLE `cmf(14)`

Chande Momentum Oscillator

SYNTAX `cmo( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Chande Momentum Oscillator of DATA ARRAY over the last PERIOD number of periods.

EXAMPLE `cmo( c,14 )`

Commodity Channel Index (Equis)

SYNTAX `ccie( PERIODS )`

FUNCTION Calculates the predefined Commodity Channel Index developed by Equis.

EXAMPLE `ccie( 14 )`

Commodity Channel Index (Standard)

SYNTAX `cci( PERIODS )`

FUNCTION Calculates the standard predefined Commodity Channel Index.

EXAMPLE `cci( 14 )`

Commodity Selection Index

SYNTAX
```
csi( PERIODS, VALUE, MARGIN,
    COMMISSION )
```

FUNCTION Calculates the predefined Commodity Selection Index.

EXAMPLE `csi(14, 50, 2500,25)`

SEE ALSO
The adx() function (page 438)
The adxr() function (page 443)
The dx() function (page 443)
The mdi() function (page 457)
The pdi() function (page 461)

Correlation Analysis

SYNTAX `correl( INDEPENDENT, DEPENDENT,PERIODS, Shift)`

FUNCTION Calculates the predefined Correlation indicator. Compares the correlation of DEPENDENT to INDEPENDENT over PERIODS time periods, after Shifting DEPENDENT to the right shift-periods.

EXAMPLE The formula "`correl( macd(), CLOSE, 5, 10 )`" compares the MACD indicator to the closing price 10 periods in the future, after statistically averaging each data array over the preceding 5 periods.

SEE ALSO The tsf() function (page 471)
The stdev() function (page 468)

Cosine

SYNTAX `cos( DATA ARRAY )`

FUNCTION Returns the cosine of DATA ARRAY. Assumes that the DATA ARRAY values are in degrees.

EXAMPLE `cos( C )`

SEE ALSO The atan() function (page 437)
The sin() function (page 468)

Cross

SYNTAX `cross( DATA ARRAY 1, DATA ARRAY 2 )`

FUNCTION Plots a "+1" on the day that DATA ARRAY 1 crosses above DATA ARRAY 2.
Otherwise, "0" is plotted.
If you want to know when DATA ARRAY 1 crosses below DATA ARRAY 2, use the formula "`cross( DATA ARRAY 2, DATA ARRAY 1)`"

EXAMPLE `cross( close, mov(close,9,e) )`

Cumulate

SYNTAX `cum( DATA ARRAY )`

FUNCTION Calculates a cumulative sum of the DATA ARRAY from the first period in the chart.

EXAMPLE The formula "`cum( 1 )`" calculates an indicator that rises one point for each day since the beginning of the chart; the formula "`cum( C )`" calculates the cumulative total of all closing prices from the beginning of the chart.

SEE ALSO `The sum() function` (page 470)

Day Of Month

SYNTAX `dayofmonth()`

FUNCTION Plots the day of the month. If today was July 15th, "15" would be plotted.

Day Of Week

SYNTAX `dayofweek()`

FUNCTION Plots the day of the week. 1=Monday, 2=Tuesday, 3=Wednesday, 4=Thursday, 5=Friday, 6=Saturday, 7=Sunday.

Delta

SYNTAX
```
delta( TYPE, DATE, PRICE, INTEREST,
    DIVIDEND )
```

FUNCTION Calculates the predefined Delta indicator.

EXAMPLE `delta( EC, 961220, 125, 7.50, 4.75 )`

SEE ALSO
The gamma() function (page 447)
The life() function (page 460)
The option() function (page 464)
The theta() function (page 470)
The vega() function (page 473)
The volo() function (page 474)
See the option() function (page 464) for a description of the parameters used in the delta() function.

DEMA

SYNTAX `dema( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined DEMA indicator

EXAMPLE `dema( c,14 )`

SEE ALSO The tema() function (page 470)

Demand Index

SYNTAX `di()`

FUNCTION Calculates the predefined Demand Index.

Detrended Price Oscillator

SYNTAX `dpo( PERIODS )`

FUNCTION Calculates the predefined Detrended Price Oscillator.

EXAMPLE `dpo( 25 )`

Directional Movement Index

SYNTAX `dx( PERIODS )`

FUNCTION Calculates the predefined Directional Movement Index.

EXAMPLE `dx( 14 )`

SEE ALSO The adx() function (page 438)
The adxr() function (page 443)
The csi() function (page 440)
The mdi() function (page 457)
The pdi() function (page 461)

Directional Movement Rating

SYNTAX `adxr( PERIODS )`

FUNCTION Calculates the predefined Directional Movement Rating.

EXAMPLE `adxr( 14 )`

SEE ALSO The adx() function (page 438)
The dx() function (page 443)
The csi() function (page 440)
The mdi() function (page 457)
The pdi() function (page 461)

Divergence

SYNTAX `divergence( DATA ARRAY 1, DATA ARRAY 2, % MINIMUM CHANGE )`

FUNCTION Plots a +1 if DATA ARRAY 1 diverges from DATA ARRAY 2 (i.e., DATA ARRAY 1 is increasing and DATA ARRAY 2 is decreasing). Plots a -1 if DATA ARRAY 1 converges from DATA ARRAY 2 (i.e., DATA ARRAY 1 is decreasing and DATA ARRAY 2 is increasing). Plots a 0 (zero) is plotted if they are moving in the same direction. Movements in DATA ARRAY 1 less than % MINIMUM CHANGE are ignored.

The Divergence function is based on the "Zig Zag" formula. First, a % MINIMUM CHANGE Zig Zag is calculated for DATA ARRAY 1. Next, a Zig Zag is calculated for DATA ARRAY 2 using the % MINIMUM CHANGE required to match the number of Zig Zag segments in DATA ARRAY 1 over the data range loaded. The two Zig Zags are then compared for divergence and convergence.

EXAMPLE The formula "`divergence( close, rsi(21), 3 )`" looks for divergences between the close and a 21-period RSI. Movements in the close less than 3% are ignored.

Division

SYNTAX `div( DATA ARRAY, DATA ARRAY )`

FUNCTION Divides the first parameter by the second. Division by zero produces a result of zero.

EXAMPLE The formula "`div( 10, 2 )`" returns 5 (this formula also could be written as "`10 / 2`").

SEE ALSO The mul() function (page 459)

Dynamic Momentum Index

SYNTAX `dmi( DATA ARRAY )`

FUNCTION Calculates the predefined Dynamic Momentum Index.

EXAMPLE `dmi( CLOSE )`

Ease of Movement

SYNTAX `emv(PERIODS, METHOD)`

FUNCTION Calculates a PERIODS moving average of the Ease of Movement value using METHOD calculation method. Valid methods are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE. These can be abbreviated as E, S, T, TRI, VAR, and W.

EXAMPLE The formula "`emv(14,S)`" returns the value of the Ease of Movement indicator smoothed with a 14-period simple moving average.

Exponent

SYNTAX `exp( DATA ARRAY )`

FUNCTION Calculates **e** raised to the DATA ARRAY power.

SEE ALSO The log() function (page 453)

External Formula

SYNTAX
```
extfml("DLL NAME.FUNCTION NAME",
    argument 1,…,argument n)
```

FUNCTION Returns the values of the function contained in an MSX DLL. This is only available if an MSX DLL is present.

EXAMPLE `ExtFml("MyDLL.MyFunction",close)` would reference a function called MyFunction contained in the MSX DLL called MyDLL, and use the closing price of the security in its calculation.

Fast Fourier Transform

SYNTAX
```
fft( DATA ARRAY, PERIODS, LENGTH,
    DETREND or MEAN, AMPLITUDE or
    POWER )
```

FUNCTION Calculates the PERIODS time period Fourier indicator of the DATA ARRAY, given sample LENGTH using the DETREND or MEAN method, and displays the AMPLITUDE or POWER spectrum.

EXAMPLE The formula "`fft( CLOSE, 100, 1, DETREND, POWER )`" returns the default Fast Fourier indicator.

Floor

SYNTAX `floor( DATA ARRAY )`

FUNCTION Calculates the highest integer that is less than DATA ARRAY.

EXAMPLE The function "`floor( 13.9 )`" returns 13.
The formula "`floor( -13.9 )`" returns -14.

SEE ALSO The ceiling() function (page 439)
The int() function (page 452)

Forecast Oscillator

SYNTAX `forecastosc( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Forecast Oscillator.

EXAMPLE `forecastosc( close, 14 )`

Formula Call

SYNTAX `fml("FORMULA_NAME" )`

FUNCTION Calculates the value of another formula. The formula can be referenced using the FORMULA_NAME in quotes. When referencing a formula's name, the name must be contained in quotation marks (e.g., `fml( "Secret A")`).
If you change a formula's name, you must also change any fml() calls that reference that formula.

EXAMPLE The formula "`fml("Secret A") * fml("MyMACD")`" calculates the value of the formula named "Secret A" multiplied by "MyMACD."

SEE ALSO The fmlvar() function (page 447)

Formula Variable Call

SYNTAX `fmlvar( "FORMULA_NAME", "VARIABLE_NAME")`

FUNCTION Calls the custom indicator named FORMULA_NAME and returns the value contained in the custom indicator's variable named VARIABLE_NAME. Both the formula's name and the variable's name must be contained in quotation marks (e.g.,`fmlvar( "Secret A", "MyVar")`). If you change a formula or variable name, you must also change any fmvarl() calls that reference that formula and variable.

EXAMPLE `fmlvar("MyIndicator", "MyVariableA" )`

SEE ALSO The fml() function (page 446)

Fraction

SYNTAX `frac( DATA ARRAY )`

FUNCTION Eliminates the integer portion of DATA ARRAY and returns the fractional part.

EXAMPLE The formula "`frac( 10.7 )`" returns 0.7; the formula "`frac(-19.8 )`" returns -0.8.

SEE ALSO The int() function (page 452)

Gamma

SYNTAX `gamma( TYPE, DATE, PRICE, INTEREST, DIVIDEND )`

FUNCTION Calculates the predefined Gamma indicator.

EXAMPLE `gamma( EC, 961220, 125, 7.50, 4.75 )`

SEE ALSO The delta() function (page 442)
The life() function (page 460)
The option() function (page 464)
The theta() function (page 470)
The vega() function (page 473)
The volo() function (page 474)
See the option() function (page 464) for a description of the parameters used in the gamma() function.

Gap Down

SYNTAX `gapdown()`

FUNCTION Plots a "+1" on the day a security's prices gap down. Otherwise a "0" is plotted. A gap down occurs if yesterday's low is greater than today's high.

Gap Up

SYNTAX `gapup()`

FUNCTION Plots a "+1" on the day a security's prices gap up. Otherwise a "0" is plotted. A gap up occurs if yesterday's high is less than today's low.

Herrick Payoff Index

SYNTAX `hpi( CENTS, MULTIPLYING FACTOR )`

FUNCTION Calculates the predefined Herrick Payoff Index.

EXAMPLE `hpi(100, 10)`

Highest

SYNTAX `highest( DATA ARRAY )`

FUNCTION Calculates the highest value in the DATA ARRAY since the first day loaded in the chart.

EXAMPLE The formula "`highest( rsi(14) )`" returns the highest Relative Strength Index value since the first day loaded in the chart; "highest (close)" returns the highest closing price since the first day loaded in the chart.

SEE ALSO The hhv() function (page 449)
The llv() function (page 454)
The lowest() function (page 454)

Highest Bars Ago

SYNTAX `highestbars( DATA ARRAY )`

FUNCTION Calculates the number of periods that have passed since the DATA ARRAY's highest value. This includes all data loaded in the chart.

EXAMPLE The formula "`highestbars( close )`" returns the number of periods that have passed since the closing price reached its highest peak.

Highest High Value

SYNTAX `hhv( DATA ARRAY, PERIODS )`

FUNCTION Calculates the highest value in the DATA ARRAY over the preceding PERIODS (PERIODS includes the current day).

EXAMPLE The formula "`hhv( CLOSE, 5 )`" returns the highest closing price over the preceding five periods; "`hhv(H,7)`" returns the highest high price over the preceding seven periods.

SEE ALSO The Stochastic Oscillator example (page 421)
The llv() function (page 454)

Highest High Value Bars Ago

SYNTAX `hhvbars( DATA ARRAY, PERIODS )`

FUNCTION Calculates the number of periods that have passed since the DATA ARRAY reached its PERIODS period peak.

EXAMPLE The formula "`hhvbars( close,50 )`" returns the number of periods that have passed since the closing price reached its 50-period peak.

Highest Since

SYNTAX
```
highestsince ( Nth, EXPRESSION,
    DATA ARRAY )
```

FUNCTION Returns the highest value of DATA ARRAY since the Nth most recent occurrence of EXPRESSION was true. This includes all data loaded in the chart.

EXAMPLE The formula "`highestsince( 2, cross (c,mov(c,10,s), close )`" returns highest value of the close since the second most recent occurrence of the close crossing above its 10-day moving average.

Highest Since Bars Ago

SYNTAX `highestsincebars( Nth, EXPRESSION, DATA ARRAY )`

FUNCTION Calculates the number of periods that have passed from the highest value of DATA ARRAY (after the Nth most recent occurrence of EXPRESSION was true). This includes all data loaded in the chart.

Put another way, this function returns the number of periods that have passed since the highestsince() function returned its value.

EXAMPLE The formula "`highestsincebars( 2, cross( c,mov(c,10,s), close )`" returns the number of periods that have passed since the highest value of the close (after the second most recent occurrence of the close crossing above its 10-day moving average).

Hour

SYNTAX `hour()`

FUNCTION On an intraday chart, plots the number of hours that have passed during the day using a 24 hour clock. For example, if the current time is recorded as 13:15:22, the hour() function will return "13".

If

SYNTAX `if( DATA ARRAY > >= < <= <> = DATA ARRAY, THEN DATA ARRAY, ELSE DATA ARRAY )`

FUNCTION A conditional function that returns the second parameter (THEN) if the conditional expression defined by the first parameter is true; otherwise, the third parameter is returned (ELSE).

EXAMPLE The formula "`if(1<2,3,4)`" will always return the value three.

SEE ALSO The On Balance Volume example (page 291)
The Indicator Builder Tutorial (page 282)
For more details on using the if() function, see page 422.

Inertia

SYNTAX `inertia( REGRESSION PERIODS, RVI PERIODS)`

FUNCTION Calculates the predefined Inertia indicator. The RVI PERIODS is the number of periods used for the Relative Volatility Index component of the indicator.

EXAMPLE `inertia(20,14)`

Input

SYNTAX `input( "PROMPT TEXT", MINIMUM VALUE, MAXIMUM VALUE, DEFAULT VALUE)`

FUNCTION This function instructs MetaStock to prompt for input when a custom indicator is plotted. This function is only supported by the Custom Indicator Builder.

Prompt Text. This defines the text displayed next to the input box. This is used to describe what should be entered.

Minimum Value. This argument is the smallest value that can be entered. If you attempt to enter a value smaller than this value, MetaStock displays a message.

Maximum Value. This argument is the largest value that can be entered. If you attempt to enter a value larger than this value, MetaStock displays a message.

Default Value. This argument defines the default value (i.e., the value that will appear in the box when the dialog is initially displayed.). Note that the default value is used if another formula using the fml() function calls the custom indicator.

EXAMPLE `input(“Enter the number of periods”,1,50,9)`

Inside

SYNTAX `inside()`

FUNCTION Plots a “+1” when an inside day occurs. An inside day occurs when today’s high is less than yesterday’s high and today’s low is greater than yesterday’s low. A range is determined by the first Inside Day and is only broken by a `Rally`, `Reaction`, or `Outside` day.

Integer

SYNTAX `int( DATA ARRAY )`

FUNCTION Removes the fractional portion of DATA ARRAY and returns the integer part.

EXAMPLE The formula "`int( 10.7 )`" returns 10; the formula "`int(-19.8 )`" returns -19.

SEE ALSO The ceiling() function (page 439)
The floor() function (page 446)
The frac() function (page 447)

Intraday Momentum Index

SYNTAX `imi( PERIODS )`

FUNCTION Calculates the predefined Intraday Momentum Index.

EXAMPLE `imi( 14 )`

IsDefined()

SYNTAX `isdefined(DATA ARRAY)`

FUNCTION Returns 1 if all data necessary to calculate the formula is available, 0 if not.

EXAMPLE The formula "`isdefined(mov(c,20,s))`" will return a 0 if there are less than 20 periods of data loaded in the chart.

IsUndefined()

SYNTAX `isundefined(DATA ARRAY)`

FUNCTION Returns 0 if all data necessary to calculate the formula is available, 1 if not.

EXAMPLE The formula "`isundefined(mov(c,20,s))`" will return a 1 if there are less than 20 periods of data loaded in the chart.

Klinger Oscillator

SYNTAX `kvo()`

FUNCTION Calculates the predefined Klinger Oscillator.

EXAMPLE The formula "`kvo()`" returns the value of the Klinger Oscillator (i.e., the solid line). The formula "`mov(kvo(),13,E)`" returns the value of the KVO's trigger line (i.e., the dotted line).

Last Value in Data Array

SYNTAX `lastvalue(DATA ARRAY)`

FUNCTION This function loads an entire data array with the last calculated value of the specified DATA ARRAY. The result of this function can be used in place of a constant in any function argument.

If DATA ARRAY is undefined (e.g., only 100-days loaded and you request the last value of a 200-day moving average) then the lastvalue function returns zero.

Since this function loads an entire data array with the last value of another array, it allows a formula to look into the future. This is unacceptable for most indicators, but is very beneficial for things like pattern recognition.

EXAMPLE The formula "`mov(close,lastvalue (fml("Determine Periods")),s)`" calculates a moving average using the number of periods returned by the indicator named "Determine Periods".

Linear Regression Indicator

SYNTAX `linearreg( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Linear Regression indicator.

EXAMPLE `linearreg( c, 50 )`

Linear Regression Slope

SYNTAX `linregslope( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Linear Regression Slope indicator.

EXAMPLE `linregslope(c, 50 )`

Logarithm (natural)

SYNTAX `log( DATA ARRAY )`

FUNCTION Calculates the natural logarithm of DATA ARRAY.

EXAMPLE The exp() function (page 445)

Lowest

SYNTAX `lowest( DATA ARRAY )`

FUNCTION Calculates the lowest value in the DATA ARRAY since the first day loaded in the chart.

EXAMPLE The formula "`lowest( rsi(14) )`" returns the lowest Relative Strength Index value since the first day loaded in the chart; "lowest (close)" returns the lowest closing price since the first day loaded in the chart.

SEE ALSO The hhv() function(page 449)
The llv() function (page 454)
The highest() function (page 448)

Lowest Bars Ago

SYNTAX `lowestbars( DATA ARRAY )`

FUNCTION Calculates the number of periods that have passed since the DATA ARRAY's lowest value.
This includes all data loaded in the chart.

EXAMPLE The formula "`lowestbars( close )`" returns the number of periods that have passed since the closing price reached its lowest point.

Lowest Low Value

SYNTAX `llv( DATA ARRAY, PERIODS )`

FUNCTION Calculates the lowest value in the DATA ARRAY over the preceding PERIODS (PERIODS includes the current day).

EXAMPLE The formula "`llv( CLOSE, 14 )`" returns the lowest closing price over the preceding 14 periods.

SEE ALSO The Stochastic Oscillator example (page 421)
The hhv() function (page 449)

Lowest Low Value Bars Ago

SYNTAX `llvbars( DATA ARRAY, PERIODS )`

FUNCTION Calculates the number of periods that have passed since the DATA ARRAY reached its PERIODS period trough.

EXAMPLE The formula "`llvbars( close,50 )`" returns the number of periods that have passed since the closing price reached its 50 period trough.

Lowest Since

SYNTAX `lowestsince ( Nth, EXPRESSION, DATA ARRAY )`

FUNCTION Returns the lowest value of DATA ARRAY since the Nth most recent occurrence of EXPRESSION was true. This includes all data loaded in the chart.

EXAMPLE The formula "`lowestsince( 2, cross (c,mov(c,10,s), close )`" returns lowest value of the close since the second most recent occurrence of the close crossing above its 10-day moving average.

Lowest Since Bars Ago

SYNTAX `lowestsincebars( Nth, EXPRESSION, DATA ARRAY )`

FUNCTION Calculates the number of periods that have passed from the lowest value of DATA ARRAY (after the Nth most recent occurrence of EXPRESSION was true). This includes all data loaded in the chart.
Put another way, this function returns the number of periods that have passed since the lowestsince() function returned its value.

EXAMPLE The formula "`lowestsincebars( 2, cross (c,mov(c,10,s), close )`" returns the number of periods that have passed since the lowest value of the close (after the second most recent occurrence of the close crossing above its 10-day moving average).

MACD

SYNTAX `macd()`

FUNCTION Calculates the predefined MACD indicator.

EXAMPLE The formula "`macd()`" returns the value of the MACD indicator (i.e., the solid line).
The formula "`mov(macd(),9,E)`" returns the value of the MACD's signal line (i.e., the dotted line).

Market Facilitation Index

SYNTAX `marketfacindex()`

FUNCTION Calculates the predefined Market Facilitation Index.

EXAMPLE `marketfacindex()`

Mass Index

SYNTAX `mass( PERIODS )`

FUNCTION Calculates the predefined Mass Index.

EXAMPLE `mass( 25 )`

Maximum

SYNTAX `max( DATA ARRAY, DATA ARRAY )`

FUNCTION Returns the largest of the two parameters.

EXAMPLE The formula "`max( CLOSE, 10 )`" returns either the closing price or 10, whichever is greater.
The formula "`max(-14, 13)`" always returns 13.

Median Price

SYNTAX `mp()`

FUNCTION Calculates the predefined Median Price indicator.

SEE ALSO The typ() function (page 472)

MESA Lead Sine

SYNTAX `mesaleadsine( CYCLE LENGTH )`

FUNCTION Calculates the predefined MESA Lead Sine indicator that plots along with MESA Sine Wave indicator (page 261).

EXAMPLE `mesaleadsine( 20 )`

SEE ALSO The mesasinewave() function (page 456).

MESA Sine Wave

SYNTAX `mesasinewave( CYCLE LENGTH )`

FUNCTION Calculates the predefined MESA Sine Wave indicator (page 261).

EXAMPLE `mesasinewave( 20 )`

SEE ALSO The mesaleadsine() function (page 456).

Midpoint

SYNTAX `mid( DATA ARRAY, PERIODS )`

FUNCTION Returns the midpoint of the DATA ARRAY over the specified time PERIOD. The midpoint is the value halfway between the highest and lowest DATA ARRAY values during the specified PERIOD.

EXAMPLE The formula "`mid( CLOSE, 7 )`" is equivalent to "`llv(C,7) + ((hhv(C,7) 2/23/2005- llv(C,7)) / 2)`".

SEE ALSO The hhv() function (page 449)
The llv() function (page 454)

Minimum

SYNTAX `min( DATA ARRAY, DATA ARRAY )`

FUNCTION Returns the smallest of the two parameters.

EXAMPLE The formula "`min( CLOSE, 10 )`" returns the closing price or 10, whichever is less. The formula "`min(-14, 13)`" always returns -14.

SEE ALSO The max() function (page 456).

Minus Directional Movement

SYNTAX `mdi( PERIODS )`

FUNCTION Calculates the predefined Minus Directional Movement indicator.

EXAMPLE `mdi( 14 )`

SEE ALSO The adx() function (page 438)
The adxr() function (page 443)
The csi() function (page 440)
The dx() function (page 443)
The pdi() function (page 461)

Minute

SYNTAX `minute()`

FUNCTION On an intraday chart, plots the number of minutes that have passed during the current hour. For example, if the current time is recorded as 10:15:22, the minute() function will return "15".

Modulus

SYNTAX `mod( DATA ARRAY, DATA ARRAY )`

FUNCTION Calculates the remainder (i.e., the fractional portion) of DATA ARRAY divided by DATA ARRAY. A division by zero produces a zero result.

EXAMPLE The formula "`mod( 10, 3 )`" returns 1.0; the formula "`mod( -10.7, 3 )`" returns -1.7. You could write an equivalent formula as "`-10.7 - (int(-10.7 / 3) * 3)`".

Momentum

SYNTAX `mo(DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Momentum indicator.

EXAMPLE `mo( 12 )`

Money Flow Index

SYNTAX `mfi( PERIODS )`

FUNCTION Calculates the predefined Money Flow Index.

EXAMPLE `mfi( 14 )`

SEE ALSO The rsi() function (page 461).

Month

SYNTAX `month()`

FUNCTION Plots the month of the year for the price. If a bar was plotted on 10/15/96, "10" would be plotted.

Moving Average

SYNTAX `mov( DATA ARRAY, PERIODS, METHOD)`

FUNCTION Calculates a PERIODS moving average of DATA ARRAY using METHOD calculation method. Valid methods are EXPONENTIAL, SIMPLE, TIMESERIES, TRIANGULAR, WEIGHTED, VARIABLE, AND VOLUMEADJUSTED. These can be abbreviated as E, S, T, TRI, VAR, and W.

EXAMPLE The formula "`mov( CLOSE, 25, EXPONENTIAL )`" returns the value of a 25-period exponential moving average of the closing prices.

Multiplication

SYNTAX `mul( DATA ARRAY, DATA ARRAY )`

FUNCTION Calculates DATA ARRAY multiplied by DATA ARRAY.

EXAMPLE The function "`mul( CLOSE, 2)`" returns the closing price multiplied by two. (This function also could be written as "`C * 2`".)

SEE ALSO The div() function (page 444)

Negative

SYNTAX `neg( DATA ARRAY )`

FUNCTION Calculates the negative of DATA ARRAY.

EXAMPLE The formula "`neg( 10 )`" returns -10; the formula "`neg( -12 )`" returns +12. This formula also could be written "`-(-12)`".

Negative Volume Index

SYNTAX `nvi(DATA ARRAY)`

FUNCTION Calculates the predefined Negative Volume Index.

SEE ALSO The pvi() function (page 461)

On Balance Volume

SYNTAX `obv(DATA ARRAY)`

FUNCTION Calculates the predefined On Balance Volume indicator.

SEE ALSO The example formula (page 291)

Option Expiration

SYNTAX `optionexp()`

FUNCTION Calculates the predefined Next Option Expiration indicator.

SEE ALSO The life() function (page 460)

Option Life

SYNTAX `life( EXPIRATION DATE )`

FUNCTION Calculates the predefined Option Life indicator.

EXAMPLE `life( 070121 )` displays the number of days until January 21, 2007.

SEE ALSO The delta() function (page 442)
The gamma() function (page 447)
The option() function (page 464)
The theta() function (page 470)
The vega() function (page 473)
The volo() function (page 474)

Outside

SYNTAX `outside()`

FUNCTION Plots a "+1" when an outside day occurs. An outside day occurs when today's high is greater than yesterday's high and today's low is less than yesterday's low. A range is determined by the first Outside Day and is only broken by a `Rally`, `Reaction`, or `Inside` day.

Parabolic SAR

SYNTAX `sar( STEP, MAXIMUM )`

FUNCTION Calculates the predefined Parabolic SAR indicator.

EXAMPLE `sar( 0.02, 0.20 )`

Peak Bars Ago

SYNTAX
```
peakbars( Nth, DATA ARRAY,
    % MINIMUM CHANGE)
```

FUNCTION Plots the number of bars that have passed from the Nth peak. This uses the Zig Zag function (page 476) to determine the peaks. N=1 would return the number of bars that have passed since the most recent peak. N=2 would return the number of bars that have passed since the 2nd most recent peak, etc.

EXAMPLE `peakbars(1,close,5)`

Peak Value

SYNTAX `peak( Nth, DATA ARRAY, % MINIMUM CHANGE )`

FUNCTION Plots the value of DATA ARRAY Nth peak(s) ago. This uses the Zig Zag function (page 476) to determine the peaks. N=1 would return the value of the most recent peak. N=2 would return the value of the 2nd most recent peak. Etc.

EXAMPLE `peak(1,close,5)`

Performance

SYNTAX `per(DATA ARRAY)`

FUNCTION Calculates the predefined Performance indicator.

Plus Directional Movement

SYNTAX `pdi( PERIODS )`

FUNCTION Calculates the predefined Plus Directional Movement indicator.

EXAMPLE `pdi( 14 )`

SEE ALSO The adx() function (page 438)
The adxr() function (page 443)
The csi() function (page 440)
The dx() function (page 443)

Polarized Fractal Efficiency

SYNTAX `pfe( DATA ARRAY, PERIODS, SMOOTHING PERIODS)`

FUNCTION Calculates the predefined Polarized Fractal Efficiency indicator.

EXAMPLE `pfe( c,10,5 )`

Positive Volume Index

SYNTAX `pvi(DATA ARRAY)`

FUNCTION Calculates the predefined Positive Volume Index.

SEE ALSO The nvi() function (page 459)

Power

SYNTAX `power( DATA ARRAY, POWER )`

FUNCTION Calculates DATA ARRAY raised to the POWER power. A negative DATA ARRAY value raised to a non-integer POWER causes an error message to be displayed.

EXAMPLE The formula "`power( 10, 3 )`" returns 1,000.

Precision

SYNTAX `prec( DATA ARRAY, PRECISION )`

FUNCTION Truncates DATA ARRAY to PRECISION decimal places.

EXAMPLE The formula "`prec( 10.12981, 2 )`" returns 10.120. The formula "`prec( 10.12981, 4 )`" returns 10.12980. Small binary rounding errors may cause some minor distortion in the decimal portion of any number stored in a computer.

Price Channel High

SYNTAX `pricechannelhigh( PERIODS )`

FUNCTION Calculates the top channel line of the Price Channel indicator.

EXAMPLE `pricechannelhigh( 14 )`

Price Channel Low

SYNTAX `pricechannellow( PERIODS )`

FUNCTION Calculates the bottom channel line of the Price Channel indicator.

EXAMPLE `pricechannellow( 14 )`

Price Oscillator

SYNTAX `oscp( PERIODS, PERIODS, MA_METHOD, DIFF_METHOD )`

FUNCTION Calculates the PERIODS/PERIODS predefined Price Oscillator indicator calculated using the MA_METHOD moving average method expressed in DIFF_METHOD.

Valid MA_METHODs are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE. These can be abbreviated as E, S, T, TRI, VAR, and W.

Valid DIFF_METHODs are PERCENT and POINTS (these can be abbreviated as **%** and **$**).

EXAMPLE The formula "`oscp(1, 25, E, $)`" returns a 1-period/25-period exponential price oscillator expressed in points.

SEE ALSO The oscv() function (page 474)

Price Volume Trend

SYNTAX `pvt(DATA ARRAY)`

FUNCTION Calculates the predefined Price Volume Trend indicator.

Projection Band Bottom

SYNTAX `projbandbot( PERIODS )`

FUNCTION Calculates the bottom Projection Band.

EXAMPLE `projbandbot( 21 )`

Projection Band Top

SYNTAX `projbandtop( PERIODS )`

FUNCTION Calculates the top Projection Band.

EXAMPLE `projbandtop( 21 )`

Projection Oscillator

SYNTAX `projosc( REGRESSION PERIODS, SLOWING PERIODS )`

FUNCTION Calculates the predefined Projection Oscillator.

EXAMPLE `projosc( 21,3 )`

Put/Call Price

SYNTAX `option( TYPE, DATE, PRICE, INTEREST, DIVIDEND )`

FUNCTION Calculates the predefined Put/Call Price indicator.

EXAMPLE The formula "`option( EC, 961231, 125, 8.5, 6.31 )`" calculates the fair market value of an equity call that matures on December 31, 1996, at a strike price of $125. The current market interest rates are 8.5% and the security paid an annual dividend of $6.31.

TYPE TYPE specifies whether the security is an Equity or a Future (i.e., E or F) and if a Put or Call price (i.e., P or C) should be calculated. Valid TYPEs are EC, EP, FC, and FP. (These types also can be spelled out as CALL, PUT, FUTURECALL, and FUTUREPUT.)

DATE The DATE is the date that the option expires. The DATE must be entered as a number in the YYMMDD format. For example, December 31, 1996, should be entered as 961231. This date format is used regardless of the date format specified in the Configuration section.

PRICE The PRICE parameter specifies the option's strike price.

INTEREST The INTEREST parameter specifies a "risk free" market interest rate (e.g., 8.75).

DIVIDEND The DIVIDEND parameter specifies the total dividends received over the last 12 months.

SEE ALSO The delta() function (page 442)
The gamma() function (page 447)
The life() function (page 460)
The theta() function (page 470)
The vega() function (page 473)
The volo() function (page 474)

Qstick

SYNTAX `qstick( PERIODS )`

FUNCTION Calculates the predefined Qstick indicator.

EXAMPLE `qstick( 21 )`

r-squared

SYNTAX `rsquared( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Rsquared indicator.

EXAMPLE `rsquared( c, 21 )`

Rally

SYNTAX `rally()`

FUNCTION Plots a “+1” when a rally day occurs. Otherwise, a “0” is plotted. A rally day occurs when today’s high is greater than the previous rally day’s high and today’s low is greater than or equal to the previous rally day’s low.

Rally With Volume

SYNTAX `rallywithvol()`

FUNCTION Plots a “+1” when a rally with volume day occurs. Otherwise, a “0” is plotted. A rally with volume occurs when today’s high is greater than the previous rally day’s high and today’s low is greater than or equal to the previous rally day’s low. Today’s volume must be greater than the previous rally day’s volume.

Random Walk Index of Highs

SYNTAX
```
rwih( MINIUMUM PERIODS, MAXIMUM
    PERIODS )
```

FUNCTION Calculates the predefined Random Walk Index of the highs indicator.

EXAMPLE `rwih( 6,39 )`

Random Walk Index of Lows

SYNTAX
```
rwil(MINIUMUM PERIODS, MAXIMUM
    PERIODS )
```

FUNCTION Calculates the predefined Random Walk Index of the lows indicator.

EXAMPLE `rwil( 6,39 )`

Range Indicator

SYNTAX
```
rangeindicator( PERIODS,
    SMOOTHING PERIODS )
```

FUNCTION Calculates the predefined Range Indicator.

EXAMPLE `rangeindicator( 10,3 )`

Rate of Change

SYNTAX `roc( DATA ARRAY, PERIODS, DIFF_METHOD )`

FUNCTION Calculates the PERIODS rate-of-change of DATA ARRAY expressed as DIFF_METHOD. Valid DIFF_METHODs are PERCENT and POINTS (these can be abbreviated as **%** and **$**).

EXAMPLE The formula "`roc( CLOSE, 12, PERCENT )`" returns the 12-period percent rate-of-change of the closing prices.

Reaction

SYNTAX `reaction()`

FUNCTION Plots a "+1" when a reaction day occurs. Otherwise, a "0" is plotted. A reaction day occurs when today's high is less than or equal to the previous reaction day's high and today's low is less than the previous reaction day's low.

Reaction With Volume

SYNTAX `reactionwithvol()`

FUNCTION Plots a "+1" when a reaction day occurs. Otherwise, a "0" is plotted. A reaction day occurs when today's high is less than or equal to the previous reaction day's high and today's low is less than the previous reaction day's low. Today's volume must be greater than the previous reaction day's volume.

Reference

SYNTAX `ref( DATA ARRAY, PERIODS )`

FUNCTION References a previous or subsequent element in a DATA ARRAY. A positive PERIOD references "n" periods in the future; a negative PERIOD references "n" periods ago.

EXAMPLE The formula "`ref( CLOSE, -12 )`" returns the closing price 12 periods ago. Thus, you could write the 12-day price rate-of-change (expressed in points) as "`C 2/23/2005- ref( C, -12 )`". The formula "`ref( C, +12 )`" returns the closing price 12 periods ahead.

Relative Momentum Index

SYNTAX `rmi( DATA ARRAY, PERIODS, MOMENTUM PARAMETER )`

FUNCTION Calculates the predefined Relative Momentum Index.

EXAMPLE `rmi( c,20,20 )`

Relative Strength Index

SYNTAX `rsi( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined RSI indicator.

EXAMPLE `rsi( 14 )`

Relative Volatility Index

SYNTAX `rvi( PERIODS )`

FUNCTION Calculates the predefined Relative Volatility Index.

EXAMPLE `rvi( 21 )`

Round

SYNTAX `round( DATA ARRAY )`

FUNCTION Rounds DATA ARRAY to the nearest integer.

EXAMPLE The formula "`round( +10.5 )`" returns +11.
The formula "`round( -10.4 )`" returns -10.

SEE ALSO The ceiling() function (page 439)
The floor() function (page 446)
The int() function (page 452)

Security Data

SYNTAX `security("SYMBOL",DATA ARRAY)`

FUNCTION Returns the value of DATA ARRAY for the specified security. If the security is in the same folder as the base security, a path is not required. You may also specify online data by using ONLINE: as the path.

EXAMPLE
```
security("c:\MetaStock Data\Sample\
    IBM",C)
security("ONLINE:IBM",C)
security("IBM",C)
```

Selling Pressure

SYNTAX `sellp()`

FUNCTION Calculates the selling pressure component of the Demand Index (page 443). Selling pressure is a measurement of the amount of volume related to selling.

Sine

SYNTAX `sin( DATA ARRAY )`

FUNCTION Returns the sine of DATA ARRAY. This function assumes that the DATA ARRAY values are in degrees.

EXAMPLE You can plot a sine wave using the formula "`sin(cum(5))`". Increasing the value in this formula (i.e., "5") will increase the frequency of the sine wave.

SEE ALSO The atan() function (page 437)
The cos() function (page 441).

Square Root

SYNTAX `sqrt( DATA ARRAY )`

FUNCTION Calculates the square root of DATA ARRAY. The square root of a negative number always returns a zero result.

EXAMPLE The formula "`sqrt( 16 )`" returns 4.

SEE ALSO The Standard Deviation example formula (page 272).

Standard Deviation

SYNTAX `stdev( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Standard Deviation indicator.

EXAMPLE `stdev( CLOSE, 21 )`

Standard Error

SYNTAX `ste( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Standard Error indicator.

EXAMPLE `ste( CLOSE, 21 )`

Standard Error Band Bottom

SYNTAX `stebandbot( DATA ARRAY, PERIODS, STANDARD ERRORS, SMOOTH METHOD, SMOOTH PERIODS)`

FUNCTION Calculates the bottom Standard Error Band of DATA ARRAY Shifted downward ERRORS standard errors.

EXAMPLE `stebandbot( close, 21, 2 )`

Standard Error Band Top

SYNTAX `stebandtop( DATA ARRAY, PERIODS, STANDARD ERRORS, SMOOTH METHOD, SMOOTH PERIODS)`

FUNCTION Calculates the bottom Standard Error Band of DATA ARRAY Shifted upward ERRORS standard errors.

EXAMPLE `stebandtop( close, 21, 2 )`

Stochastic Momentum Index

SYNTAX `stochmomentum( PERIODS, SMOOTHING, DOUBLE SMOOTHING )`

FUNCTION Calculates the predefined Stochastic Momentum Index.

EXAMPLE `stochmomentum( 10,40,3 )`

Stochastic Oscillator

SYNTAX `stoch( %K PERIODS, %K SLOWING )`

FUNCTION Calculates the predefined Stochastic Oscillator.

EXAMPLE The formula "`stoch( 5, 3 )`" returns the value of a 5-period %K slowed 3-periods.

SEE ALSO The Stochastic example formula (page 421).

Subtraction

SYNTAX `sub( DATA ARRAY, DATA ARRAY )`

FUNCTION Calculates DATA ARRAY minus DATA ARRAY.

EXAMPLE The formula "`sub( 10, 2 )`" returns eight. (This formula also could be written as "`10 - 2`)"

SEE ALSO The add() function (page 437).

Summation

SYNTAX `sum( DATA ARRAY, PERIODS )`

FUNCTION Calculates a cumulative sum of the DATA ARRAY for the specified number of lookback PERIODs (including today).

EXAMPLE The formula "`sum( CLOSE, 12 )`" returns the sum of the preceding 12 closing prices. A 12-period simple moving average could be written "`sum(C,12) / 12`".

SEE ALSO The cum() function (page 442).

Swing Index

SYNTAX `swing( LIMIT MOVE )`

FUNCTION Calculates the predefined Swing Index indicator. The Swing Index requires opening prices.

EXAMPLE `swing( 3.0 )`

SEE ALSO The aswing() function (page 437).

TEMA

SYNTAX `tema( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined TEMA indicator

EXAMPLE `tema( c,14 )`

SEE ALSO The dema() function (page 442).

Theta

SYNTAX
```
theta( TYPE, DATE, PRICE, INTEREST,
    DIVIDEND )
```

FUNCTION Calculates the predefined Theta indicator.

EXAMPLE `theta( EC, 961220, 125, 7.50, 4.75 )`

SEE ALSO The delta() function(page 442)
The gamma() function (page 447)
The life() function (page 460)
The option() function (page 464)
The vega() function (page 473)
The volo() function (page 474)
See the option() function (page 464) for a description of the parameters used in the theta() function.

Tick

SYNTAX `tick()`

FUNCTION Plots the number of ticks that have come in during the current minute. For example, if the current tick is recorded as 10:15:22, “22” represents the tick count in the 15th minute of the 10th hour. At the start of the 16th minute, the tick count will reset to “0.” Note that this function only works on charts with an intraday interval set to “0” (i.e., tick charts).

When plotted on tick charts, the value will range from 0 to 999—meaning up to 999 ticks can be recorded in one minute. Using this function on bar charts (e.g., 1-minute, 5-minute, etc.) will result in a value of zero.

Time Series Forecast

SYNTAX `tsf( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined PERIODS Time Series Forecast indicator of DATA ARRAY.

EXAMPLE The formula “`tsf( CLOSE, 10 )`” returns a 10-period Time Series Forecast of the closing prices.

SEE ALSO The correl() function (page 441).

Trade Volume Index

SYNTAX `tvi( DATA ARRAY, MINIMUM TICK )`

FUNCTION Calculates the predefined Trade Volume Index.

EXAMPLE `tvi( 0.125 )`

SEE ALSO The obv() function (page 459).

TRIX

SYNTAX `trix( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined TRIX indicator.

EXAMPLE `trix( 12 )`

Trough Bars Ago

SYNTAX `troughbars( Nth, DATA ARRAY, % MINIMUM CHANGE)`

FUNCTION Plots the number of bars that have passed from the Nth trough. This uses the Zig Zag function (page 476) to determine the troughs. If Nth is 1, then this will return the number of bars that have passed since the most recent trough. If Nth is 2, this will return the number of bars that have passed since the 2nd most recent trough, etc.

EXAMPLE `troughbars(1,close,5)`

Trough Value

SYNTAX `trough( Nth, DATA ARRAY, % MINIMUM CHANGE )`

FUNCTION Plots the value of DATA ARRAY Nth trough(s) ago. This uses the Zig Zag function (page 476) to determine the troughs. N=1 would return the value of the most recent trough. N=2 would return the value of the 2nd most recent trough, etc.

EXAMPLE `trough( 1,close,5 )`

Typical Price

SYNTAX `typical()`

FUNCTION Calculates the predefined Typical Price indicator.

Ultimate Oscillator

SYNTAX `ult( CYCLE1, CYCLE2, CYCLE3 )`

FUNCTION Calculates the predefined Ultimate Oscillator indicator using the three cycle lengths supplied as parameters.

Note that each of the three parameters must be greater than the preceding parameter or an error message will be displayed (e.g., "`ult( 5, 5, 5)`" is not valid).

EXAMPLE The formula "`ult( 7, 14, 21 )`" returns the default Ultimate Oscillator.

Value When

SYNTAX `valuewhen ( Nth, EXPRESSION, DATA ARRAY )`

FUNCTION Returns the value of the DATA ARRAY when the EXPRESSION was true on the Nth most recent occurrence. This includes all data loaded in the chart.

EXAMPLE The formula "`valuewhen( 2, cross (c,mov(c,10,s), rsi(20) )`" returns the value of the RSI on the 2nd most recent occurrence of the closing price crossing above its 10-day moving average.

Variance

SYNTAX `var( DATA ARRAY, PERIODS )`

FUNCTION Calculates the statistical variance of DATA ARRAY over the specified time PERIOD.

EXAMPLE `var( CLOSE, 20 )`

SEE ALSO The stdev() function (page 468)
The Standard Deviation example (page 272).

Vega

SYNTAX `vega( TYPE, DATE, PRICE, INTEREST, DIVIDEND )`

FUNCTION Calculates the predefined Vega indicator.

EXAMPLE `vega( EC, 961220, 125, 7.50, 4.75 )`

SEE ALSO The delta() function (page 442)
The gamma() function (page 447)
The life() function (page 460)
The option() function (page 464)
The theta() function (page 470)
and the volo() function (page 474)
See the option() function (page 464) for a description of the parameters used in the vega() function.

Vertical Horizontal Filter

SYNTAX `vhf( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Vertical Horizontal Filter of DATA ARRAY over the specified time PERIOD.

EXAMPLE `vhf( C, 28 )`

Volatility, Chaikin's

SYNTAX `vol( MA PERIODS, ROC PERIODS )`

FUNCTION Calculates the predefined Chaikin's Volatility indicator.

EXAMPLE `vol( 10, 10 )`

Volatility, Option

SYNTAX `volo()`

FUNCTION Calculates the predefined Option Volatility indicator.

EXAMPLE `volo()`

SEE ALSO The delta() function(page 442)
The gamma() function (page 447)
The life() function (page 460)
The option() function (page 464)
The theta() function (page 470)
The vega() function (page 473)

Volume Oscillator

SYNTAX `oscv( PERIODS, PERIODS, MA_METHOD, DIFF_METHOD)`

FUNCTION Calculates the PERIODS/PERIODS predefined Volume Oscillator indicator calculated using the MA_METHOD moving average method expressed in DIFF_METHOD.
Valid MA_METHODs are SIMPLE, EXPONENTIAL, WEIGHTED, TIMESERIES, TRIANGULAR, and VARIABLE (these can be abbreviated as **S**, **E**, **W**, **T**, **TRI**, and **VAR**).
Valid DIFF_METHODs are PERCENT and POINTS (these can be abbreviated as **%** and **$**).

EXAMPLE `oscv( 1, 25, SIMPLE, $ )`

SEE ALSO The oscp() function (page 463).

Weighted Close

SYNTAX `wc()`

FUNCTION Calculates the predefined Weighted Close indicator.

Wilder's Smoothing

SYNTAX `wilders( DATA ARRAY, PERIODS )`

FUNCTION Calculates the predefined Wilder's Smoothing indicator.

EXAMPLE `wilders( CLOSE, 14 )`

SEE ALSO The mov() function (page 458).

Williams' %R

SYNTAX `willr( %R PERIODS )`

FUNCTION Calculates the predefined Williams' %R indicator.

EXAMPLE `willr( 14 )`

Williams' A/D

SYNTAX `willa()`

FUNCTION Calculates the predefined Williams A/D indicator.

Write If

SYNTAX
```
writeif( EXPRESSION, "TRUE TEXT",
    "FALSE TEXT" )
```

FUNCTION This function can only be used within an expert commentary. If EXPRESSION evaluates to "true", then the TRUE TEXT string is displayed within the commentary. If EXPRESSION evaluates to "false", then the FALSE TEXT string is displayed.

EXAMPLE
```
writeif( c > mov(c,200,s),
    "The close is above the
    200-period moving average.","The
    close is below the 200-period
    moving average." )
```

SEE ALSO For more detailed information on using the writeif() function within an expert commentary, see page 595.

Write Value

SYNTAX `writeval( DATA ARRAY )`

or

`writeval( DATA ARRAY , FORMAT )`

FUNCTION This function can only be used within an expert commentary. It is used to display the numeric value and decimal format of DATA ARRAY. The decimal format is X.Y where X is the total number of digits, and Y is the number of digits to the right of the decimal point.

EXAMPLE
```
writeval( stoch(39,3) - stoch(12,3)
    ,5.2)
```

SEE ALSO For more detailed Information on using the writeval() function within an expert commentary, see page 595.

Year

SYNTAX `year()`

FUNCTION Plots the year. If a bar was plotted on 10/15/96, the function will return “1996.”

Zig Zag

SYNTAX
```
zig( DATA ARRAY, MINIMUM CHANGE,
    DIFF_METHOD )
```

FUNCTION Calculates the MINIMUM CHANGE predefined Zig Zag indicator of DATA ARRAY using the DIFF_METHOD method of calculation.
Valid DIFF_METHODs are PERCENT and POINTS (these can be abbreviated as **%** and **$**).

EXAMPLE
```
zig( CLOSE, 5, PERCENT )
```

Candlestick Functions

The Candlestick functions allow you to locate specific Japanese Candlestick patterns. Each function plots a "+1" when the pattern is found; otherwise a "0" is plotted.

The brief interpretations provided for the patterns shown on the following pages were taken from two books written by Steve Nison. For more in-depth coverage on these and other Japanese Candlestick patterns and charting techniques, Equis International recommends Mr. Nison's books: *Japanese Candlestick Charting Techniques* and *Beyond Candlesticks* For more information on these books, see page 765.

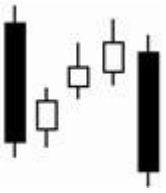
Note: Please note that candlestick pattern recognition is subjective. What one person calls a "Big Black Candle" may not qualify as such for someone else. To find these patterns on a chart, MetaStock must rely on predefined rules. These rules were defined based upon our own experience and with Steve Nison's assistance.

IMPORTANT: When using the Candlestick functions in an exploration, you must choose the **Load __ Records** button in The Explorer Options dialog (page 556) and specify at least *10*; otherwise the exploration results may be inaccurate.

Bearish 3 Method Formation

SYNTAX `bear3formation()`

PATTERN



DESCRIPTION A long black body followed by three small, usually white, bodies and another long black body. The three white bodies are contained within the first black body's range.

INTERPRETATION A bearish continuation pattern.

Bearish Harami

SYNTAX `bearharami()`

PATTERN

DESCRIPTION A small black body is contained within an unusually large white body.

INTERPRETATION A bearish pattern when preceded by an uptrend.

Bearish Harami Cross

SYNTAX `bearharamicross()`

PATTERN

DESCRIPTION A Doji contained within a large white body.

INTERPRETATION A top reversal signal.

Big Black Candle

SYNTAX `bigblack()`

PATTERN

DESCRIPTION An unusually long black body with a wide range between high and low, and prices open near the high and close near the low.

INTERPRETATION A bearish pattern.

Big White Candle

SYNTAX `bigwhite()`

PATTERN

DESCRIPTION An unusually long white body with a wide range between high and low, and prices open near the low and close near the high.

INTERPRETATION A bullish pattern.

Black Body

SYNTAX `black()`

PATTERN

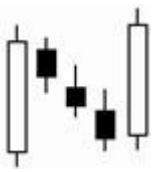
DESCRIPTION A candlestick formed when the closing price is lower than the opening price.

INTERPRETATION A bearish signal. More important when part of a pattern.

Bullish 3 Method Formation

SYNTAX `bull3formation()`

PATTERN



DESCRIPTION A long white body followed by three small, usually black, bodies and another long white body. The three black bodies are contained within the first white body's range.

INTERPRETATION A bullish continuation pattern.

Bullish Harami

SYNTAX `bullharami()`

PATTERN

DESCRIPTION A small white body is contained within an unusually large black body.

INTERPRETATION A bullish pattern when preceded by a downtrend.

Bullish Harami Cross

SYNTAX `bullharamicross()`

PATTERN

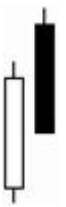
DESCRIPTION A Doji contained within a large black body.

INTERPRETATION A bottom reversal signal.

Dark Cloud Cover

SYNTAX `darkcloud()`

PATTERN



DESCRIPTION A long white candlestick is followed by a black candlestick. The black candlestick opens above the white candlestick's high and closes well into the white candlestick's body.

INTERPRETATION A bearish reversal signal during an uptrend.

Doji

SYNTAX `doji()`

PATTERN

DESCRIPTION The open and close are the same.

INTERPRETATION Doji lines are usually components of many important candlestick patterns.

Doji Star

SYNTAX `dojistar()`

PATTERN

DESCRIPTION A Doji which gaps above or below a white or black candlestick.

INTERPRETATION A reversal signal with confirmation during the next trading day.

Engulfing Bearish Line

SYNTAX `engulfingbear()`

PATTERN

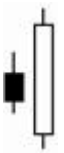
DESCRIPTION A small white body followed by and contained within a large black body.

INTERPRETATION A major top reversal signal.

Engulfing Bullish Line

SYNTAX `engulfingbull()`

PATTERN



DESCRIPTION A small black body followed by and contained within a large white body.

INTERPRETATION A major bottom reversal signal.

Evening Doji Star

SYNTAX `eveningdojistar()`

PATTERN

DESCRIPTION A large white body followed by a doji that gaps above the white body. The third candlestick is a black body that closes well into the white body.

INTERPRETATION A major top reversal signal, more bearish than the regular evening star pattern because of the Doji.

Evening Star

SYNTAX `eveningstar()`

PATTERN

DESCRIPTION A large white body followed by a small body (white or black) that gaps above the white body. The third candlestick is a black body that closes well into the white body.

INTERPRETATION A major top reversal signal.

Falling Window

SYNTAX `fallingwindow()`

PATTERN

DESCRIPTION A window (i.e., gap) between the low of the first candlestick and the high of the second candlestick. This produces the same results as the Gap Down function (page 447).

INTERPRETATION A rally to the window is highly probable. The window should provide resistance.

Gravestone Doji

SYNTAX `gravestonedoji()`

PATTERN

DESCRIPTION The open and close are at the low of the period.

INTERPRETATION A market top reversal signal. The longer the upper shadow the more bearish the signal.

Hammer

SYNTAX `hammer()`

PATTERN

DESCRIPTION A small body (white or black) near the high with a long lower shadow with little or no upper shadow.

INTERPRETATION A bullish pattern during a downtrend.

Hanging Man

SYNTAX `hangingman()`

PATTERN

DESCRIPTION A small body (white or black) near the high with a long lower shadow with little or no upper shadow. The lower shadow should be two or three times the height of the body.

INTERPRETATION A bearish pattern during an uptrend.

Inverted Black Hammer

SYNTAX `invblackhammer()`

PATTERN

DESCRIPTION An upside-down hammer with a black body.

INTERPRETATION A bottom reversal signal with confirmation the next trading day.

Inverted Hammer

SYNTAX `invhammer()`

PATTERN

DESCRIPTION An upside-down hammer (white or black).

INTERPRETATION A bottom reversal signal with confirmation the next trading day.

Long Legged Doji

SYNTAX `longleggeddoji()`

PATTERN

DESCRIPTION A Doji pattern with very long upper and lower shadows.

INTERPRETATION A market top reversal signal.

Long Lower Shadow

SYNTAX `longlowershadow()`

PATTERN

DESCRIPTION A candlestick (black or white) with a lower shadow that has a length 2/3 or more of the total range of the candlestick.

INTERPRETATION A bullish signal, particularly when around price support levels.

Long Upper Shadow

SYNTAX `longuppershadow()`

PATTERN

DESCRIPTION A candlestick (black or white) with an upper shadow that has a length 2/3 or more of the total range of the candlestick.

INTERPRETATION A bearish signal, particularly around price resistance levels.

Morning Doji Star

SYNTAX `morningdojistar()`

PATTERN

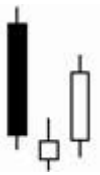
DESCRIPTION A large black body followed by a doji that gaps below the black body. The third candlestick is a white body that closes well into the black body.

INTERPRETATION A major bottom reversal signal, more bullish than the regular morning star pattern because of the Doji.

Morning Star

SYNTAX `morningstar()`

PATTERN



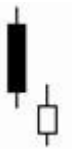
DESCRIPTION A large black body followed by small body (white or black) that gaps below the black body. The third candlestick is a white body that closes well into the black body.

INTERPRETATION A major bottom reversal signal.

On Neck Line

SYNTAX `onneckline()`

PATTERN



DESCRIPTION A black candlestick in a downtrend followed by a small white candlestick with its close near the low of the black candlestick.

INTERPRETATION A bearish pattern where the market should move lower when the white candlestick's low is penetrated.

Piercing Line

SYNTAX `piercingline()`

PATTERN

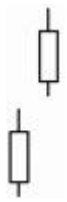
DESCRIPTION A black candlestick followed by a white candlestick that opens lower than the black candlestick's low, but closes more than halfway into the black body.

INTERPRETATION A bottom reversal signal.

Rising Window

SYNTAX `risingwindow()`

PATTERN



DESCRIPTION A window (i.e., gap) between the high of the first candlestick and the low of the second candlestick. This produces the same results as the Gap Up function (page 448).

INTERPRETATION A selloff to the window is highly probable. The window should provide support.

Separating Lines

SYNTAX `separatinglines()`

PATTERN 1

DESCRIPTION 1 In an uptrend, a black candlestick is followed by a white candlestick with the same opening price.

PATTERN 2

DESCRIPTION 2 In a downtrend, a white candlestick is followed by a black candlestick with the same opening price.

INTERPRETATION A continuation pattern. The prior trend should resume.

Shaven Bottom

SYNTAX `shavenbottom()`

PATTERN

DESCRIPTION A candlestick (white or black) with no lower shadow.

INTERPRETATION See Inverted Hammer (page 484) interpretation.

Shaven Head

SYNTAX `shavenhead()`

PATTERN

DESCRIPTION A candlestick (white or black) with no upper shadow.

INTERPRETATION See Hammer (page 483) and Hanging Man (page 484) interpretations.

Shooting Star

SYNTAX `shootingstar()`

PATTERN

DESCRIPTION A candlestick (white or black) with a small body, long upper shadow, and little or no lower shadow.

INTERPRETATION A bearish pattern in an uptrend.

Spinning Top

SYNTAX `spinningtop()`

PATTERN

DESCRIPTION A candlestick (white or black) with a small body. The size of the shadows is not important.

INTERPRETATION A neutral pattern. Spinning tops are more important when part of other formations.

Three Black Crows

SYNTAX `3blackcrows()`

PATTERN

DESCRIPTION Three long black candlesticks with consecutively lower closes that close near or at their low prices.

INTERPRETATION A top reversal signal.

Three White Soldiers

SYNTAX `3whitesoldiers()`

PATTERN

DESCRIPTION Three white candlesticks with consecutively higher closes near or at their high prices.

INTERPRETATION A bottom reversal signal.

Tweezer Bottoms

SYNTAX `tweezerbottoms()`

PATTERN

DESCRIPTION Two or more candlesticks with matching bottoms. The size or color of the candlestick does not matter. The candlesticks do not have to be consecutive.

INTERPRETATION Minor reversal signal that is more important when the candlesticks form another pattern.

Tweezer Tops

SYNTAX `tweezertops()`

PATTERN

DESCRIPTION Two or more candlesticks with matching tops.

INTERPRETATION Minor reversal signal that is more important when the candlesticks form another pattern. The candlesticks do not have to be consecutive.

White Body

SYNTAX `white()`

PATTERN

DESCRIPTION A candlestick formed when the closing price is higher than the opening price.

INTERPRETATION A bullish signal. More important when part of a pattern.

Testing Your Trading Ideas

What is a System Test?

System testing involves the development and testing of trading systems to determine the systems' historical profitability. System testing helps answer the question, "If I had traded this security using these trading rules, how much money would I have made or lost?"

You can use MetaStock to:

- Write trading systems using your own trading rules.
- Test your trading systems.
- Examine the test results by plotting buy/sell arrows and equity lines, and by examining tabular reports.
- Automatically optimize parameters within your trading rules to improve the results.
- Compare trading systems to find out which trading system works best on a particular security.

It is very important that you read the System Tutorial that begins on the following page before developing your own trading systems.

IMPORTANT: Due to the inherent complexity in the design and creation of custom indicators, trading systems, explorations, and experts, Equis cannot provide support over the phone for this process. However, support is available through email. The `Formula Help.doc` file, found in the MetaStock folder, is a sample request form you can use when requesting this service. Complete the form in detail and email it to *formulas@equis.com* or submit a request via the Equis web site under Customer Zone | Trading Resources | Custom Formulas. This service is usually free, but we reserve the right to charge a fee for extensive development.

System trading rules use the same syntax as custom indicators. If you are unfamiliar with the MetaStock formula language, see page 415.

When developing trading systems, please keep in mind that technical analysis is a dynamic tool (possibly an art) and as such, no mechanical system is flawless. Don't let yourself get caught in the trap of "overfitting" your system to a specific set of data. For tips on system development, see page 536.

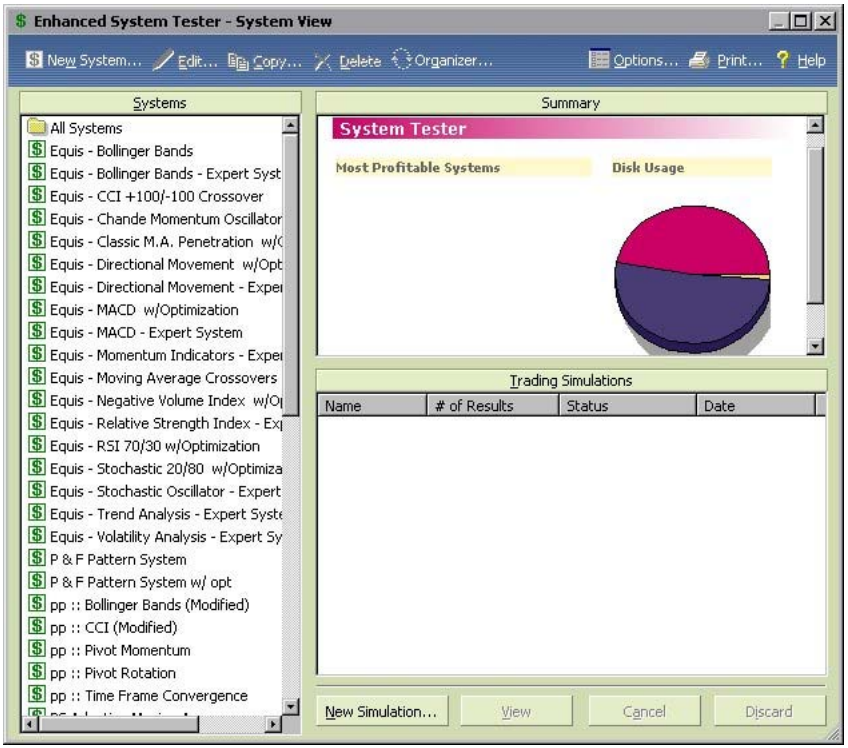
Enhanced System Tester Tutorial

This short tutorial introduces several terms and concepts relating to system testing. It is important that you read this tutorial before you create your own trading systems. You should also be familiar with the MetaStock formula language (page 415) and custom indicators (page 282).

Enhanced System Tester butto

Step 1 - Open The Enhanced System Tester

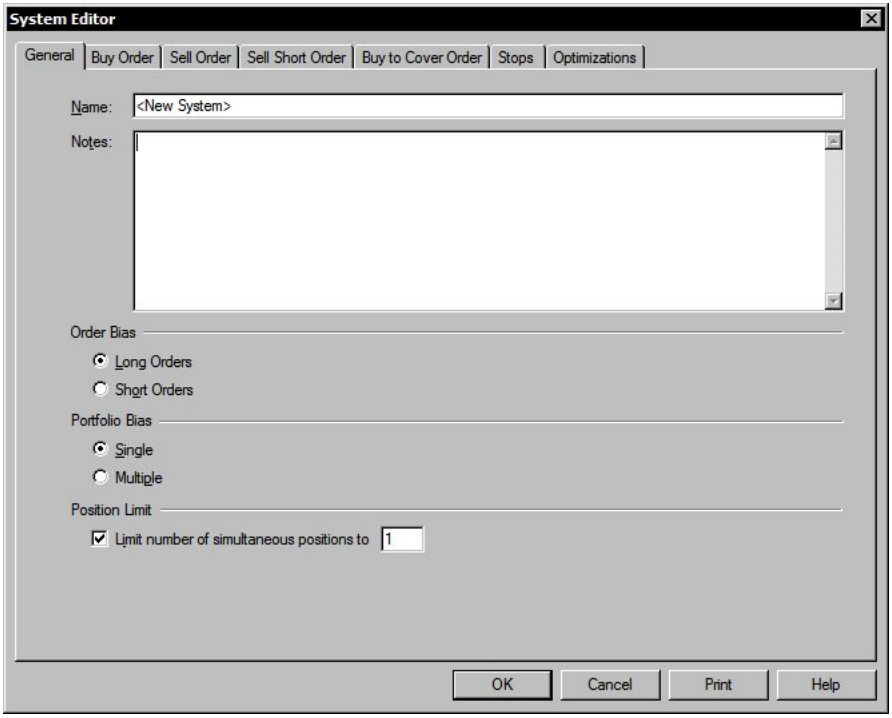
Choose Enhanced System Tester from the Tools menu or click the Enhanced System Tester button on the standard toolbar.



The Enhanced System Tester lets you create, test, compare, print, and report your system tests.

Step 2 - Create Two New Systems

1. With the Enhanced System Tester displayed, click the **New System** button in the upper left corner.
   The System Editor dialog appears.



   The General page of the System Editor dialog has text entry boxes for the system's name and notes, and three options. Don't worry about the three options for now; they're explained in detail later in this chapter (page 508).
2. In the Name field, type the system name, *My First System*.
3. Click the Buy Order tab and enter the following trading rule for entering a long position(buy order) in the Formula text box:
   `cross(close, mov(close,25,simple))`
4. The preceding rule, as with most trading rules in MetaStock, can be read in English. It says, "Buy the security when the close crosses above a 25-period simple moving average of the close." (As with custom indicators, you can abbreviate "close" to "c" and "simple" to "s".)
5. Trading rules (page 543) are very similar to custom indicators (page 282). Just ignore the other options on the Buy Order page; they'll be explained later in this chapter.

6. Enter the following information for the next three trading rules. Remember to click on the corresponding tabs (i.e., Sell Order, Sell Short Order, and Buy to Cover Order) to enter each of the rules.

   Sell Order: `cross(mov(close,25,simple),close)`

   Sell Short Order:
   `cross(mov(close,25,simple),close)`

   Buy to Cover Order:
   `cross(mov(close,25,simple),close)`

7. If a syntax error exists in your trading rules, a message explaining the error will appear. Click the **OK** button to acknowledge the error. The System Editor will reappear with the cursor placed at the position where the error exists. You should then correct the error and reselect **OK**.
8. When the four trading rules have been entered correctly, click the **OK** button.
9. With My First System highlighted, click the **Copy** button at the top of the screen. A copy of "My First System" appears at the top of the system list.
10. Click the Copy of My First System to highlight it, then click the **Edit** button.
11. In the General page, change the name to *My Second System*.
12. In the trading rules (Buy Order, Sell Order, Sell Short Order, Buy to Cover Order), change the 25's to 50's.
13. Click **OK**.

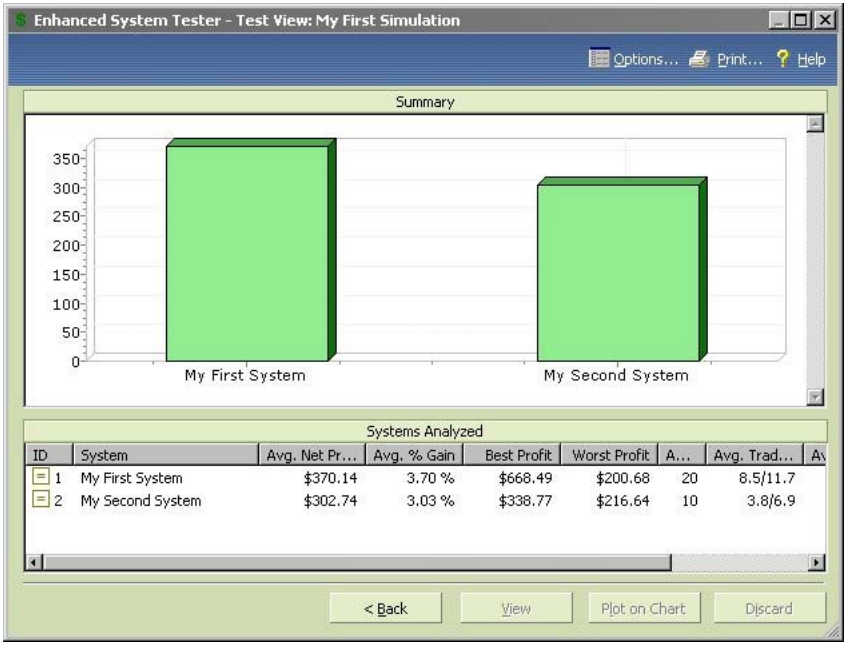
Step 3 - Test the Systems

1. When the Enhanced System Tester reappears (and My First System is highlighted), click the **New Simulation** button. The Perform Trading Simulation wizard appears (page 514).
2. The first dialog in the wizard is the Select Systems dialog. Find My First System in the list and highlight it.
3. Hold the CTRL key and click My Second System to select it as well.
4. Click **Next**. The Select Securities dialog appears.
5. Click the **Add Securities** button.
   The Add Securities dialog appears, where you can select any number of local or online securities.
6. Select ten securities (using the CTRL key), then click **Open**.
   You return to the Select Securities dialog.
7. Click **Next**. The System Testing Options dialog appears.
   We're not changing any options for this tutorial, but if you are interested in this dialog, see page 514.

8. In the System Testing Options dialog, click **Next**.
   The Begin Trading Simulation dialog appears.
9. Type *My First Simulation* in the field under the words "The System Tester will now perform the simulation".
10. Click **Start**. The Perform System Test wizard closes, and a small window appears, showing you details about the simulation's progress. A blue bar next to a dollar sign in the lower right corner of the MetaStock workspace also indicates the test's progress.
11. When the test is complete, click **View Results**.

Step 4 - View the Results

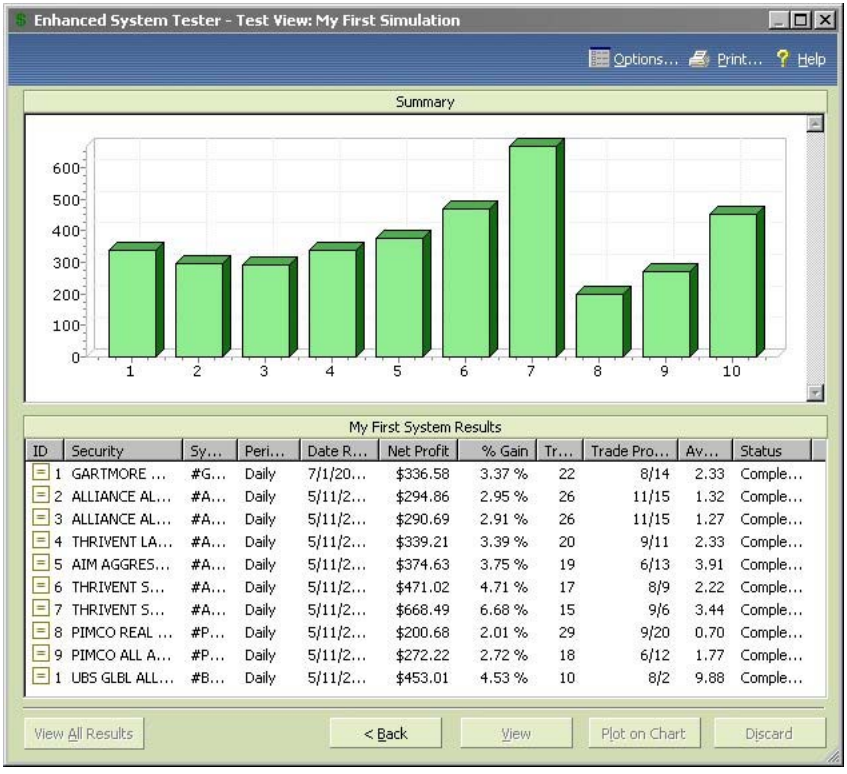
When you click the **View Results** button, the Enhanced System Tester's Test View appears.



Since we tested more than one system, this screen compares the systems' performance. The graph at the top shows each system's average net profit. You can also sort the systems in the list below the

graph by clicking the Avg. Net Profit column (or any other column in the list).

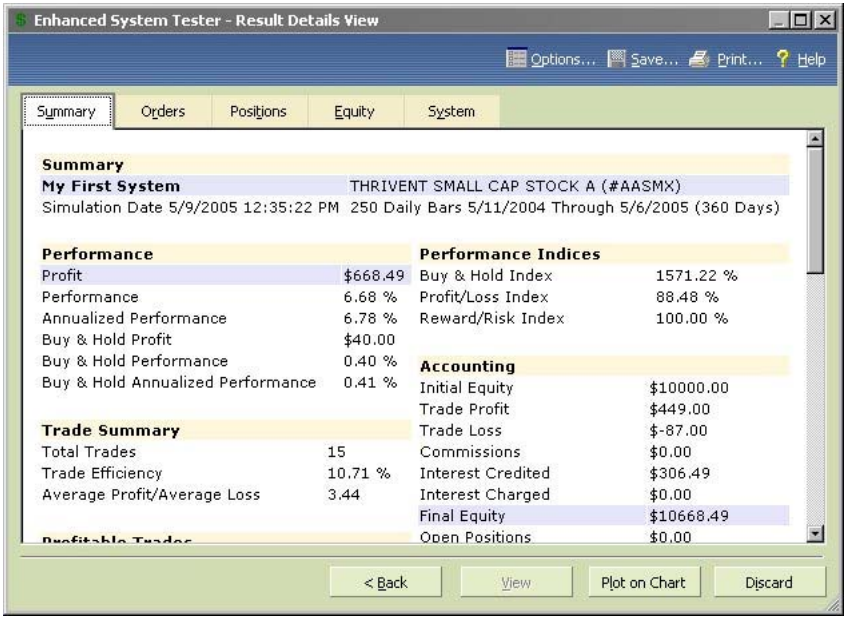
In this example, “My First System” had the highest average net profit. In the lower pane, double-click on “My First System.” Another version of the Test View appears.



This screen is also divided into two main sections. The graph in the top section shows what each security’s equity would have been if the system had been followed. The bottom section shows a list of all the securities the system tested, with more detailed information about their data and their performance in the simulation. You can sort the securities in the list by clicking any of the column headings (like Net Profit).

In the list, click a security that performed well in the simulation (had a high net gain or profit/loss ratio) and click the **View** button to

display the Result Details View. (If none of the securities were profitable, select the one that lost the least money, then click **View**.)



Five reports are available from the Details View dialog. For more information about what these reports tell you, see page 520.

Step 5 - Optimizing

Optimizing involves replacing components of trading rules or stops with "OPT" variables and then specifying the range of values to be tested. MetaStock then performs multiple tests, replacing the OPT variables with values from the range you specified.

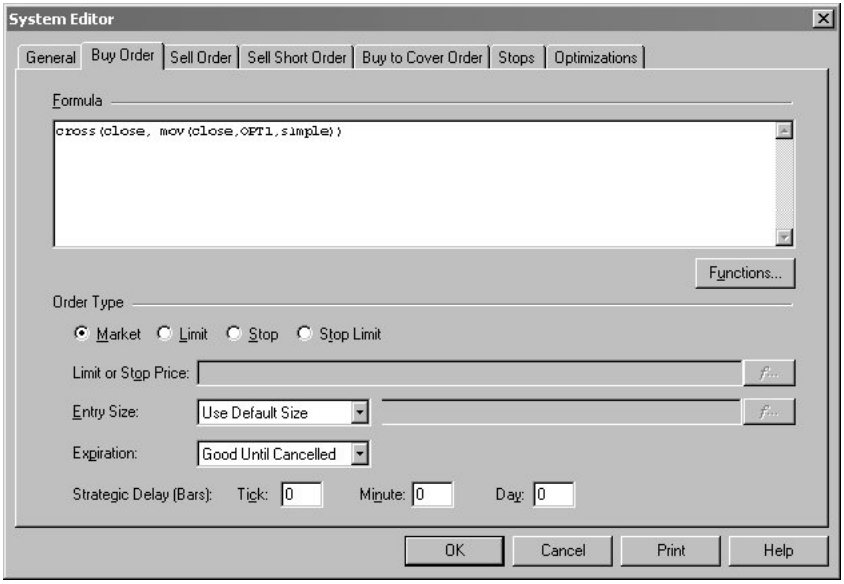
"My First System" in this tutorial tested the buy/sell signals generated by a 25-period moving average. We will now have MetaStock optimize our trading rules to determine the optimum number of periods to use for the moving average.

To Enter the Optimization Variable

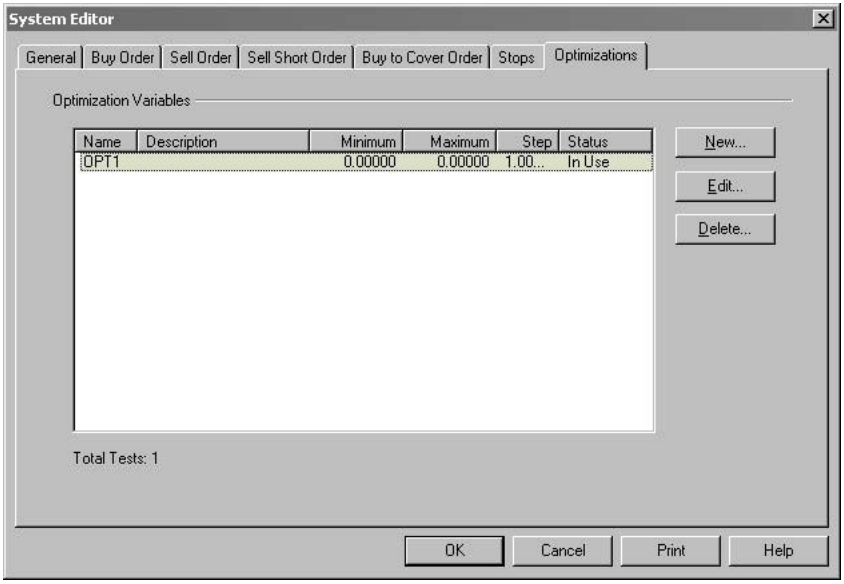
1. With the Enhanced System Tester displayed, select My First System and click the **Edit...** button.

   In the four trading rules we created in ***Step 2 - Create Two New Systems***, replace the "25" with "*OPT1*" (for

*opt*imization variable number *1*). This is shown for the Buy Order rule in the following illustration:

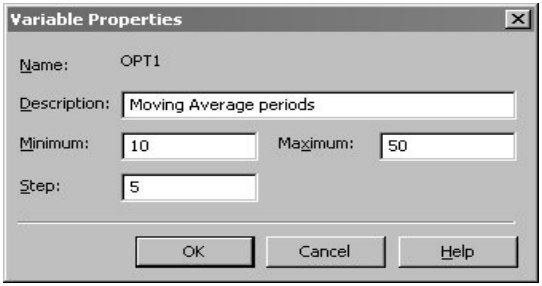


1. Click the Optimization tab. The Optimization page appears.



2. Click OPT1 in the list.
3. Click the **Edit** button. The Variable Properties dialog appears. We want to test the moving average from 10-periods to 50-periods, by five period increments (i.e., 10, 15, 20, etc.).

4. Enter "*Moving average periods*" as OPT1's description.
5. Type a Minimum value of *10*, a Maximum value of *50*, and a Step value of *5* (as shown in the following illustration).



6. Click **OK**.
7. Look at the Total Tests value at the bottom of the Optimization Variables dialog. This value shows the total number of tests (nine in this case) that will be performed. It's always wise to check this value after editing the optimization variables, as it is very easy to create a system that will generate thousands of tests.
8. Click **OK** in the System Editor dialog to return to the Enhanced System Tester dialog.

Step 6 - Test the Optimization System

1. In the Enhanced System Tester, with My First System still highlighted, click the **New Simulation...** button.
2. Complete the New Simulation wizard (page 514).
3. Name this simulation *My Optimized Simulation* and click **Start**.

   During the optimizing, MetaStock displays information regarding the number of tests to be performed, the elapsed hours of testing, and the best and worst gains/losses.
4. When the test is complete, click **View Results**.

Note: Only the five most profitable results will appear, by default. To see more results, you can change the number in the Results section of the System Testing Options dialog (page 504).

Step 7 - Display the Optimization Reports

1. When the "System Test Completed" message appears, click the **View Results** button. The Enhanced System Tester appears.
2. Click My Optimized Simulation in the lower right portion of the Enhanced System Tester.
3. Click **View**. The Enhanced System Tester's Test View appears. The five most profitable results are displayed. (You can change how many results are displayed in the System Testing Options dialog.) The tests are arranged in the report by their average net

profit. Click any column heading (Avg. Net Profit, Total Profit, etc.) to sort the results according to that column's value.

Note: The optimization variable's value appears in the far right column for each result.

4. In the list, click a security that performed well in the simulation (had a high net gain or profit/loss ratio) and click the **View** button to display the Result Details View.

Five reports are available from the Result Details View dialog.
For more information about what these reports tell you,
see page 520

Tutorial Summary

You have completed the Enhanced System Tester Tutorial.
In an attempt to keep this tutorial as concise as possible, we did not fully explore MetaStock's system testing capabilities. However, you should now be somewhat familiar with the process of creating a trading system. The remainder of this chapter provides detailed information on system testing.

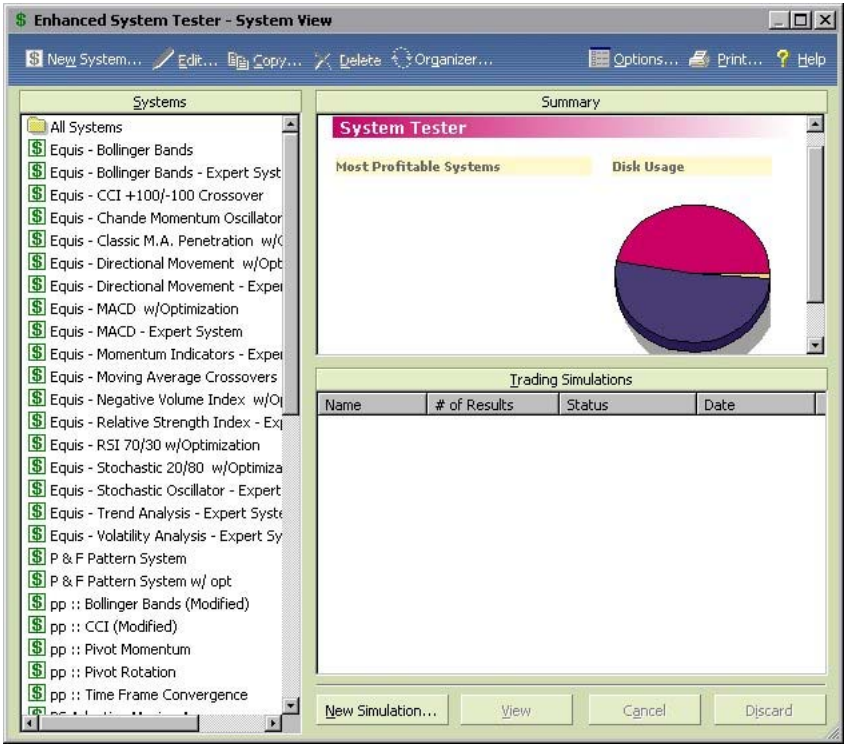
If you will be testing futures and commodities, For information on printing reports, see page 541 for special instructions.

The Enhanced System Tester

The System Test Manager is the starting screen for all Enhanced System Tester activities. From here you can:

- View all your systems
- Create, copy, edit and delete systems
- View all the tests run against any systems
- Create, perform and repeat tests
- View test details

The Systems Test Manager is divided into three sections:
The Systems List (left side), the Report Summary (top right), and the Trading Simulations List (bottom right).



New System. Opens the System Editor dialog where you can create your own custom system using MetaStock's formula language (page 415).
For more information on the System Editor dialog, see page 507.

Edit… Opens the System Editor, where you can modify the selected system test.
For more information on the System Editor dialog, see page 507.

Copy… Makes a copy of the selected system. The copy is named "Copy of <system>" and appears alphabetically in the list.

Delete. Removes the selected system test from the list.

Organizer. Opens the Organizer wizard, where you can import or export formula files.
For more information on the Formula Organizer, see page 432.

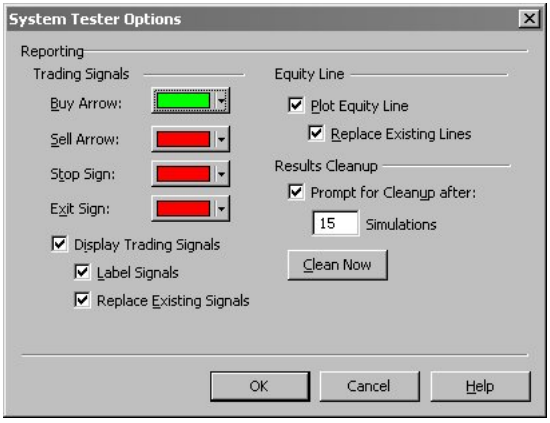
Options. Opens the Enhanced System Tester Options dialog, described below.

Print. Opens the print dialog.

Help. Opens the help system.

The System Tester Options Dialog

You can open this dialog by clicking the **Options** button in the upper right corner of the Enhanced System Tester.



Buy Arrow, Sell Arrow, Stop Sign, Exit Sign. Choose a color for each of these symbols here.

Once you've run a test and you've selected a security that worked well with that test, you can open a chart for that security. If the system generated any signals (buy, sell, stop, or exit), the chart will show when those signals were generated. By default, buy signals are represented by a green arrow; sell signals are represented by a red arrow; exit signals are represented by a red exit sign; and stops are represented by a red stop sign.

Display Trading Signals. Uncheck this box to plot the tested security's chart without the buy and sell arrows and stop and exit signs. Note that when this box is unchecked, the next two options are disabled.

Label Signals. When this box is checked, two numbers appear above each trading signal. The first number indicates how many shares were bought or sold. The second number (in parentheses) is the order number.

Replace Existing Signals. If the security you're plotting from the Enhanced System Tester already has signals, this option will replace the old signals with the test's new signals.

Plot Equity Line. Uncheck this box to plot the tested security without an equity line.

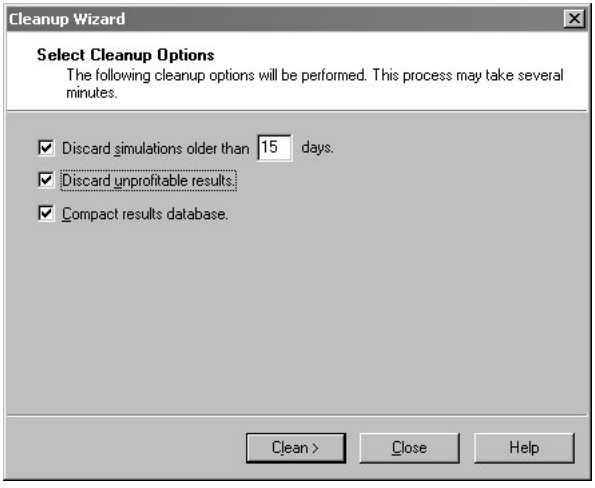
Replace Existing Lines. If the security you're plotting from the Enhanced System Tester already has an equity line, this option will replace the old equity line with the test's new line.

Prompt for Cleanup after ____ Simulations. Once you've run this number of simulations, MetaStock will ask you if you want to run the cleanup wizard (described below). This wizard deletes old analyses and unprofitable results.

Clean Now. Click this button to open the cleanup wizard (described below).

The Cleanup Wizard

The cleanup wizard frees up space on your hard drive by deleting old analyses and unprofitable results.



Discard simulations older than ___ days. Enter a number in the field to determine how old a simulation has to be in order to delete it.

Discard unprofitable results. When this box is checked the Cleanup Wizard deletes results that lost money or broke even.

Compact results database. Frees up some space on your hard drive by compressing the files that contain your test results.

Click **Clean** to delete the selected analyses and/or results.

The Systems List

The Systems List (on the left side of the Enhanced System Tester) shows all the available systems. Single click on a system to see all the tests run on that system (in the Trading Simulations List section). Double click on a system to open the System Editor dialog for that system. Right-click on a system to open the pop-up menu, which contains options to create a new system, create a new simulation, and to edit, copy or delete a system.

Click the All Systems folder at the top of the list to see all the results in the Trading Simulations List for all systems tested.

Note: If a system has results from a simulation, it will look like this: .

Systems with no results look like this:

The Report Summary

The Report Summary (in the upper right section of the Enhanced System Tester) lists the securities that returned the most profitable results in the simulations that were run. The Report Summary also contains a pie chart that tells you how much space on your hard drive is taken up with system test results, how much free space is available on the hard drive, and how much space is taken up by other files.

The Trading Simulations List

The Trading Simulations List shows all the tests run on the selected system or systems, as well as currently running tests. If a test has multiple results, they are summarized here.

Note: You can see all the results for all systems tested by clicking the All Systems folder in the Systems List.

Double click on a test to view its results (if it is complete) or its status (if it is running).

The Trading Simulations List has its own set of buttons, described below.

New Simulation. Opens the Perform System Test wizard, where you can create and initiate a new test. For more information on creating a new test, see page 514.

View. When a test is selected, this button opens the Test View dialog, where you can see all the simulations performed for a given test. For more information on the Test View dialog, see page 518.

Cancel. Stops the currently running test. This button is only available when a test is running.

Discard. Removes the selected test from the Trading Simulations List.

Creating a System Test

Every system test contains four trading rules. The trading rules specify when Buy/Sell positions should be opened/closed. System tests may also have optimization variables and stops.

To create a new system, click the **New System** button in the Enhanced System Tester dialog. MetaStock can store up to 1,000 system tests.

After you click **New System**, the System Editor dialog appears.

The System Editor

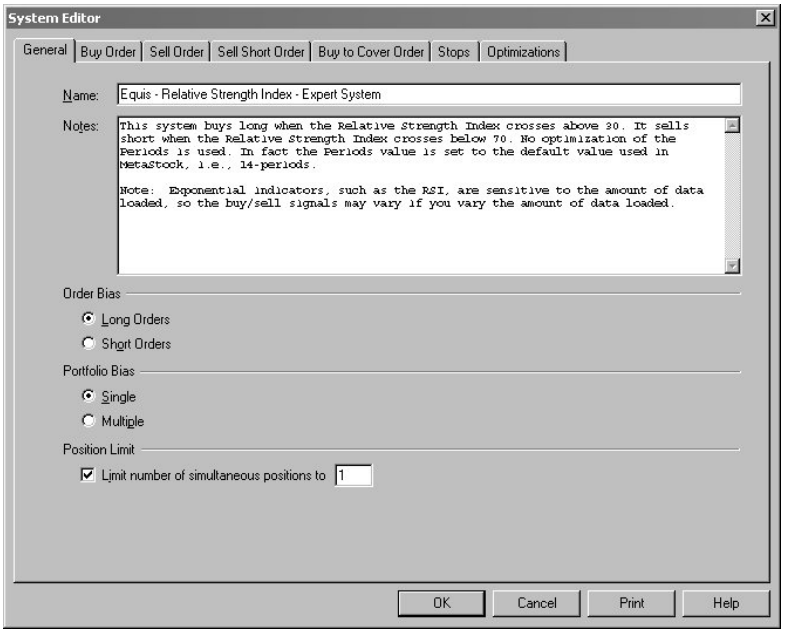
The System Editor Dialog lets you name the system test, store notes regarding the system, and define several trading rules.

To open the System Editor, either double-click on a system in the Systems List, or click the **Edit...** button in the upper left corner of the Enhanced System Tester.

The System Editor dialog is divided into seven pages; each page is selected by clicking its tab. The pages are described below.

General

You can edit a system's name here, as well as read and edit any notes associated with the system.



You can also set three rules to govern how the system executes trades under certain circumstances:

Order Bias. Sometimes a system produces long and short signals simultaneously. This rule tells MetaStock which to choose when long and short signals appear at the same time.

Portfolio Bias. You can instruct MetaStock to close all existing positions for an existing bias (long or short) when an opposite position opening order is placed. For example, if you want MetaStock to close all short positions when it places a new long position, select the Single option. If you want to let MetaStock place long and short orders simultaneously, select the Multiple option.

Position Limit. Check this option to close any open positions before new positions are opened. You can specify that only one position can be open at a time, or you can allow up to 65,536 simultaneous open positions by unchecking this box.

Buy/Sell Signals

The System Editor offers four rules for initiating buy/sell signals:

Buy Order

This rule specifies when the system should purchase a given number of shares of the current security.

Sell Order

This rule specifies when the system should sell one or more existing long positions.

Sell short

This rule specifies when the system should borrow a given number of shares of the current security and to sell them on the market.

Buy to Cover

This rule specifies when the system should close one or more existing short positions by repurchasing and returning the borrowed shares.

The buy/sell rules use the options and fields described below:

Formula The system's formula appears here. For information on the MetaStock formula language, see page 415.

Functions This button opens the Paste Functions dialog, where you can view all the functions (and their parameters) available in the MetaStock formula language.For information on the Paste Functions dialog, see page 420.

Order Type

If you want the test to use limit, stop, or stop limit orders, indicate that here.

Market This order executes at the Trade Price selected on the Trade Execution page of the System Tester Options dialog (page 518).

Limit The order seeks the best price available above or below (depending on the Order Type) a given limit price.

Stop The order seeks the best market price available once a given limit price has been met or exceeded in a direction defined by the Order Type.

Stop Limit The order seeks the best price available above or below (depending on the Order Type) a given limit price once that limit has been met or exceeded in a direction also defined by the Order Type.

Limit or Stop Price The price used when a non-market order is generated.

Entry Size Enter the number of shares you want the test to purchase or sell when opening a long or short position. The number can be a dollar amount, a number of units, a percentage of available equity, or a number of units defined by a formula.

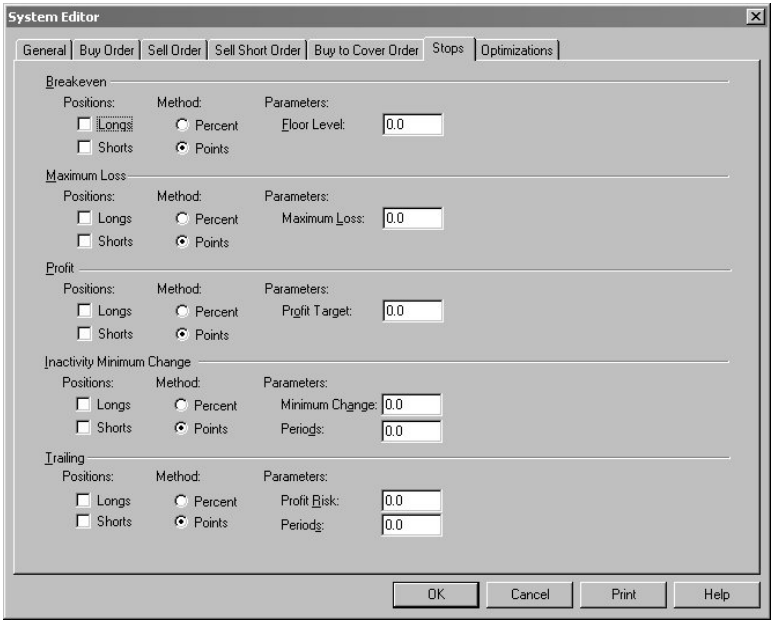
Note: If you are expressing this number as a percentage, the number should be a decimal value.

Expiration Tell the system to close the order at the end of the day or leave it open until another rule closes it.

Strategic Delay By default, systems test data as if it were downloaded and analyzed in real time. But some data providers only provide data 20 minutes after it's actually updated. If this is the case, you could tell the Enhanced System Tester to delay its trades by 20 minutes to more accurately test your method of trading. Also, you may only download end of day data. In that case, you could delay all the system's trades by one day.

Stops

In addition to trading rules, each trading system can have up to five "stops." Stops are set by clicking the Stops tab in the System Editor dialog. Stops are used to close long and/or short positions based on the position's gains/losses. For example, the Maximum Loss stop will close a position if the position loses more than a specified amount.



When a stop is triggered, the position is closed regardless of the current status of your trading rules. The price at which the position is closed is the actual stop price or the specified exit price.

If the price gaps below a stop level on a long position, MetaStock exits at the open price of the next bar. If no open price is available, the high price of the next bar is used. Likewise, if the price gaps above a stop level on a short position, MetaStock Pro exits at the open price of the next bar. If no open price is available, the low price of the next bar is used.

Stops automatically take entry and exit commissions into account. For example, the Maximum Loss stop knows the amount of your "exit" commission and will attempt to close the position so the maximum loss will not be exceeded after you pay the exit commission.

If two stops are triggered on the same bar, the more conservative stop takes precedence (i.e., the stop that generates the most losses). The precedence of stops is: Maximum Loss, Breakeven, Trailing, Profit Target, and Inactivity.

For information on optimizing stops, page 510.

Breakeven

This stop closes an open position when the closed-out value of the position would fall below the current equity amount (i.e., the equity amount at the time the current trade was opened). The stop is placed at the price where the trade could be closed and the proceeds generated would equal the current equity amount.

To prevent this stop from being executed every time a position is opened (because commissions ensure there is never a profit when a trade is first opened), the Breakeven stop is enabled only after the profit for the trade meets or exceeds the user specified "floor level." The value you enter in the Floor Level box depends on the Method specified (points or percent). The floor level uses the high price for a long trade and the low price for a short trade.

This stop takes a minimum of two bars to trigger. One bar for the floor level and another bar for the breakeven amount.

Tip If the floor level is set to zero, the Breakeven stop will become enabled only after the security's price increases to the point where the position could be closed without incurring a loss.

Maximum Loss

This stop closes an open position when the losses resulting from the trade exceed the specified Maximum Loss amount.

Example. If you set the Maximum Loss to 5%, positions will be closed when losses exceed 5% of your current equity (including commissions).

Caution: If you set the Maximum Loss to a value that is less than or equal to the Entry Commission, every trade will be closed immediately after opening the position, because all trades will have a loss the moment they are entered (due to commissions).

Profit

This stop closes an open position when a specified Profit level is reached.

Example. If you specify 10% as the profit, open positions will be closed when they generate a 10% increase in your current equity (after considering the effect of commissions).

Inactivity Minimum Change

This stop closes an open position when the security's price does not generate a minimum positive price change within a specified time period. (A "positive price change" is defined by an upward price movement while in a long position and a downward price movement while in a short position.)

Type the Minimum Change and the number of Periods. The Method to use when calculating the Minimum Change can be specified in Percentage or Points.

Example. If you specify 1% as the Minimum Change and 20 as the number of Periods, MetaStock will automatically close any long (short) positions where the security's price has not increased (decreased) by at least 1% within any 20-period time frame.

This stop analyzes changes in price, not equity, and therefore ignores commissions.

Trailing

This stop closes an open position when a specified amount (i.e., Profit Risk) of the current position's profits are lost.

Each time a position's profits reach a new high, the Trailing stop is placed at a level that allows a specified portion of the position's profits to be lost. You specify the amount of the loss in the Profit Risk box (using either Percent or Points method).

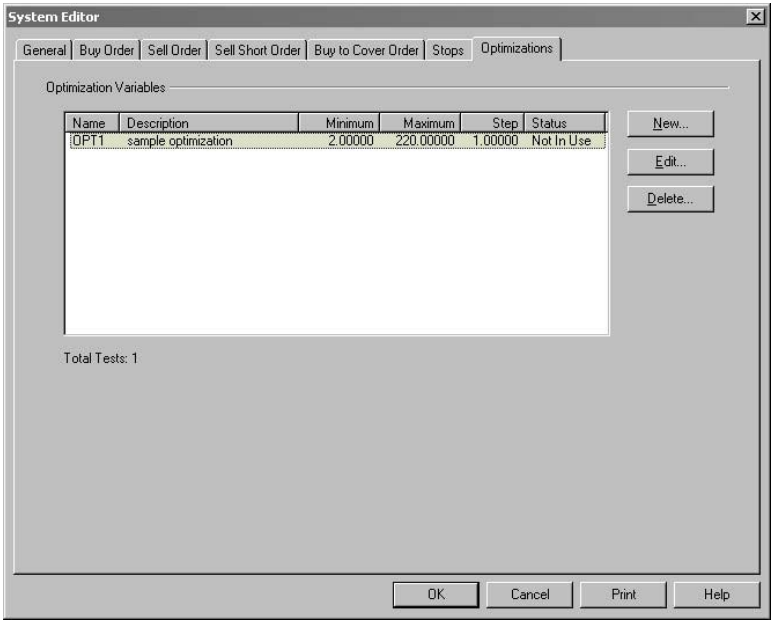
MetaStock allows you to specify the number of periods to ignore. For example, if you specify "4" for the Periods, then the Trailing stop will lag by four periods. This means that the last four periods' profits or losses will be ignored when determining the current stop level. This filters out any price swings (up or down) that occur during the last four periods.

This stop is designed to lock in profits, not to limit losses. The Trailing stop only limits the amount of *profits* that can be lost. Losses are limited by the Maximum loss stop (page 512).

Since trailing stops are determined by the profit level, not the price level, no special considerations exist for short positions.

Example. 5% is specified for the Profit Risk, 0 for the Periods, and your current position has a profit of $100.00. The stop would be triggered if the change in the security's price caused your profits to drop to $95.00 (or less).

Optimizations



New. Opens the Variable Properties dialog (page 533) where you can create a new optimization variable.

Edit. Opens the Variable Properties dialog where you can change an existing optimization variable.

Delete. Removes the selected optimization variable.

Copying and Deleting System Tests

You can make a copy of the selected system test(s) in the Enhanced System Tester dialog using the **Copy** button. Just select the system you want to copy, and click the Copy button. A system named "Copy of <system name>" appears in the list (sorted alphabetically). This is useful when you want to design a new system test that is very similar to another.

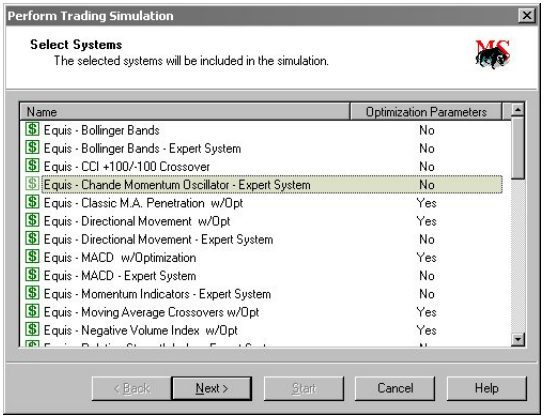
For example, if System A was very similar to a new system you want to create, you could use the Copy command in the Enhanced System Tester dialog to make a copy rather than rewriting it. You could then make the minor modifications necessary and name it System B.

You delete the selected system tests from the Enhanced System Tester dialog using the **Delete** button.

Testing Systems

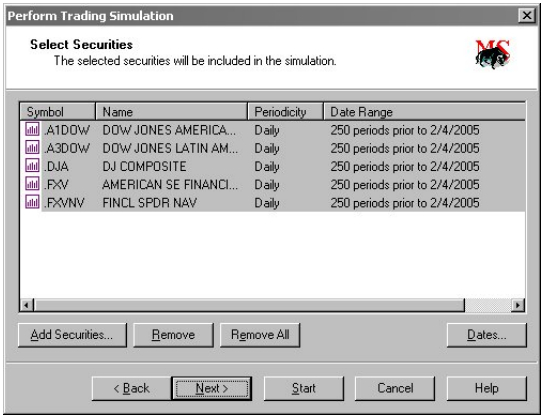
When you click the **New Simulation** button in the Enhanced System Tester dialog, the Perform Trading Simulation wizard appears. This wizard takes you through four steps:

Step 1: Select Systems



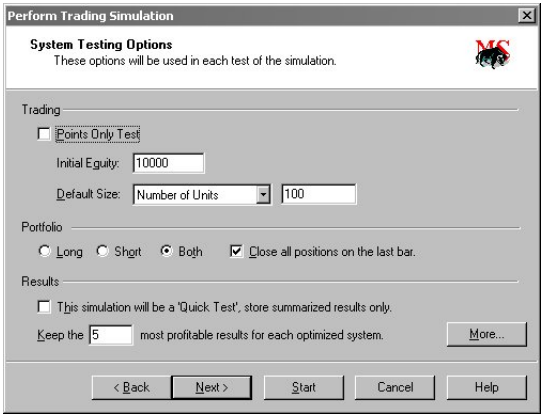
Select the system you want to test and click **Next**. To select multiple tests, hold down the CTRL key while you click the tests you want to include. Or click a test, then hold down the SHIFT key and click another test. All the tests between the two you click will be selected.

Step 2: Select Securities



Click **Add Securities...** to select the securities you want to include in the test and click **Next** for more options, or click **Start** to begin the simulation. After you've added securities to the test, you can click the **Dates...** button to specify a date range or number of periods to test.

Step 3: System Testing Options



You can set the following options from this page:

Trading

Points Only Test Check this box if you are trading futures or commodities and want to track the number of points gained or lost instead of the currency values. For more information on points only system testing, see page 541.

IMPORTANT: When running points-only tests on more than one security, make sure the securities show similar levels of volatility. For example, if one security in a test shows 1000-point intraday

swings and another security in the same test never changes more than a few points in a single day, the test's results may be skewed.

Initial Equity This is the starting balance of the account.

Default Size You can tell the system to place each order based on a number of shares, total transaction cost, or percentage of equity available.

Note: These two options are unavailable when Points Only Test is selected.

Portfolio

Long/Short/Both Determine what type(s) of positions are allowed: Long, Short, or Both.

Close all positions on the last bar If this is unchecked, any open positions will remain open after the test is complete.

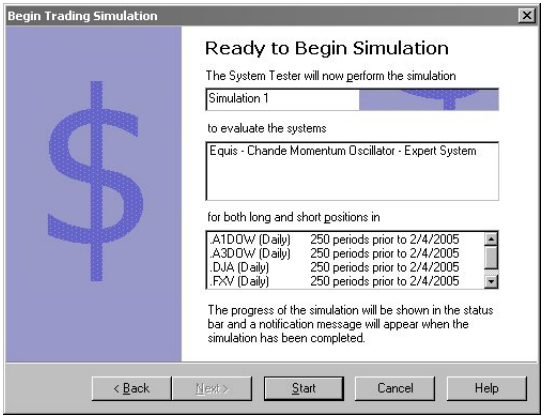
Results

The checkbox in this section lets you run the simulation as a Quick Test. A Quick Test takes less time to run than a normal simulation, and the results take up less disk space. However, Quick Tests don't generate the Positions, Equity and Orders reports that normal simulations do. Quick Tests are highly recommended when you're running a system that generates several tests. You can also determine how many results you want to see for systems that use optimization variables in this section.

More... This button opens the System Testing Options dialog. For more information about System Testing Options, see page 493.

When you've entered all your options, click **Next** to see a summary of the simulation, or click **Start** to begin.

Step 4: Ready to Begin Test



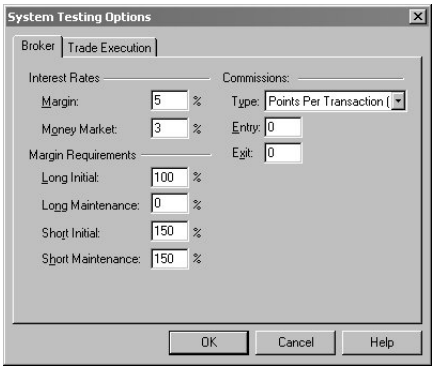
This dialog summarizes the selections you made in the previous dialogs. Click **Back** to change any options, or click **Start** if you're ready.

System Testing Options Dialog

This dialog contains several options divided into two sections: Broker and Trade Execution.

Note: Some options will be disabled if Points Only is selected.

Broker



Margin This interest rate is used to calculate the annual interest applied to all debit balances.

Money Market This interest rate is used to calculate the annual interest applied to all credit balances.

Long Initial This percentage is used to calculate the initial equity necessary to open a long position on margin.

Long Maintenance This percentage is used to calculate the initial equity necessary to maintain a long position on margin.

Short Initial This percentage is used to calculate the equity necessary to open a short position on margin. The percentage can be as low as 101% and as high as 200%. For example, if the account balance is $5,000 and the Short Initial is 150%, the system would allow a short sell of $10,000. At 110% and $5,000, it would allow a short sell of $50,000. At 200% and $5,000, it would only allow a short sell of $5,000.

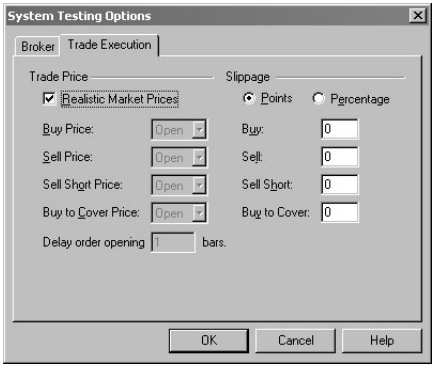
Short Maintenance This percentage is used to calculate the equity necessary to maintain a short position on margin.

Type Choose how your broker's commission will be calculated here. Choose either Points per Transaction, Points per Unit, or Percentage of Transaction Value.

Entry Enter your broker's entry commission here (based on the commission type).

Exit. Enter your broker's exit commission here (based on the commission type)

Trade Execution



Realistic Market Prices When this box is checked, any triggered order executes at the open of the next bar. When it's unchecked, the Buy, Sell, Sell Short and/or Buy to Cover Prices execute at the specified values (Open, Close, High or Low).

Delay order opening ____ bars. Enter a number here to execute orders "*x*" bars after the trade is signaled.

Slippage (Points, Percentage, Buy, Sell, Sell Short, Buy to Cover) These options let you introduce a degree of loss to the system by simulating delayed executions. For example, you see your stock has reached $20, so you call your broker and tell him to sell 100 shares. By the time the trade executes, the price may have changed. Slippage conservatively simulates this phenomenon by lowering all types of trades by a specific percentage or number of points.

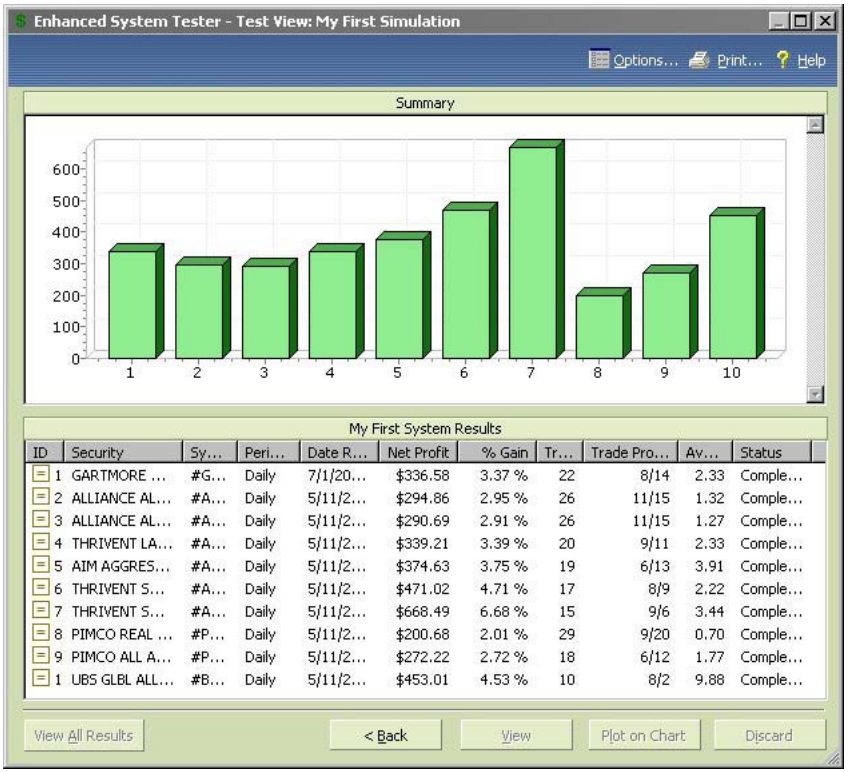
The Test View Screen

There are three "versions" of the Test View screen. If you tested multiple systems, the Test View screen shows the most profitable systems based on the average net profit of all the securities each system tested. And if you tested multiple securities, the Test View Screen shows the securities that returned the highest net profit when the system was applied. Finally, if you tested multiple systems and multiple securities, you can compare one security's performance in all the systems tested by clicking **View All Results**.

The Test View Screen for Multiple Systems

The top half of the above screen shows the average net profit of the most profitable systems tested. The list at the bottom of the screen

shows more information about the most profitable systems in the test. You can sort the list of systems by clicking any column heading (like Avg. Net Profit).



Back Returns you to the Enhanced System Tester.

View All Results Select any single security in the list and click this button to see how the security performed in the other systems in the test (if you tested multiple systems).

Back Returns you to the Enhanced System Tester (or the Test View screen for multiple systems, if you tested multiple systems).

View Opens the Result Details dialog, described in the next section.

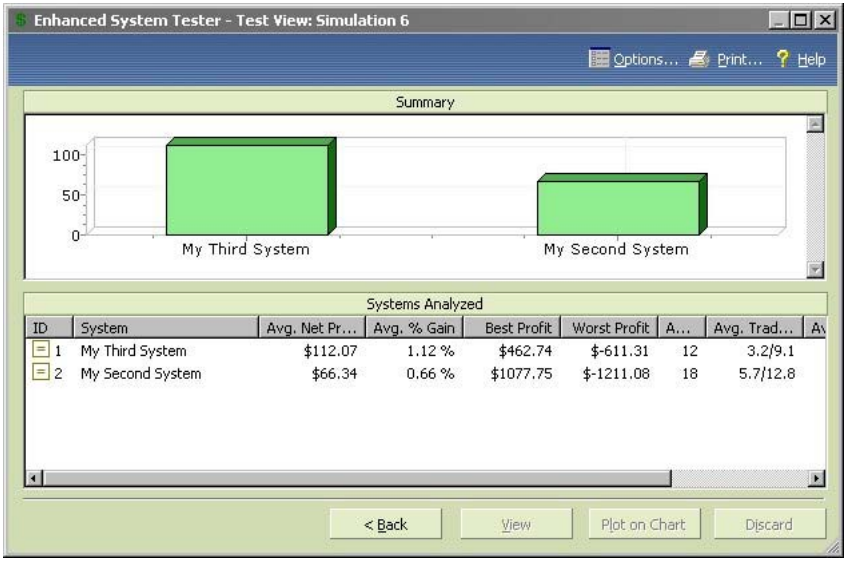
View All This button is only available if an optimized result is selected. Clicking **View All** displays all the test results, not just the most optimal.

Plot on Chart Opens the smart chart for the security used in the selected test. (The chart appears behind the Enhanced System Tester, so you'll need to close the Enhanced System Tester to see it.) The resulting equity line and buy/sell arrows appear on the chart. You can change the color of the arrows and other details in the Enhanced System Tester Options dialog, described on page 503.

Discard Removes the selected result from the list.

The Test View Screen - View All Results

If you tested multiple systems, you can select a single security and see how it performed in each of the systems tested. The graph shows the selected security's net profit for each system tested. The list shows more information about the security's performance in each of the systems tested.



Back Returns you to the Test View for multiple securities.

View Opens the Result Details dialog, described in the next section.

Plot on Chart Opens the smart chart for the security used in the selected test. (The chart appears behind the Enhanced System Tester, so you'll need to close the Enhanced System Tester to see it.) The resulting equity line and buy/sell arrows appear on the chart. You can change the color of the arrows and other details in the Enhanced System Tester Options dialog, described on page 503.

Discard Removes the selected result from the list.

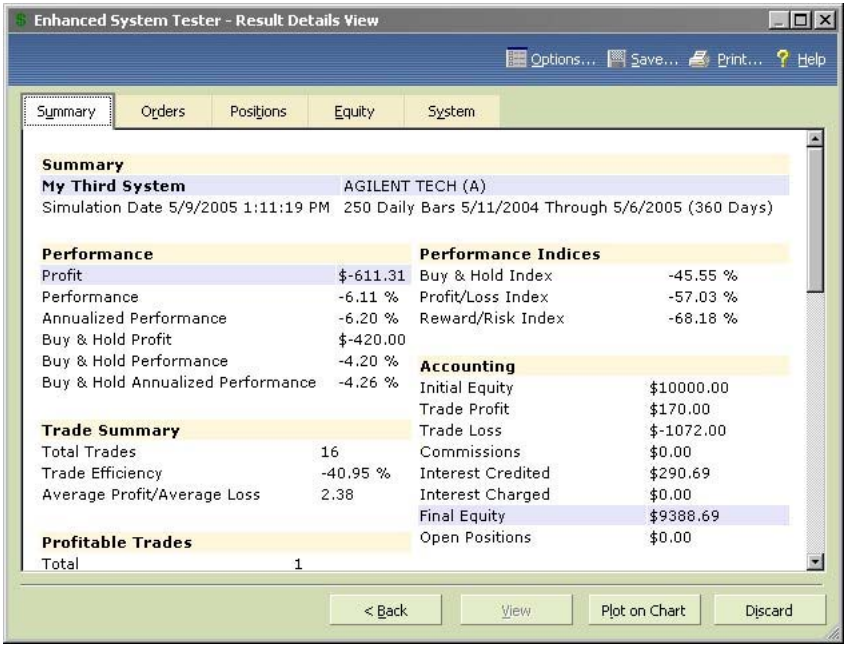
The Results Detail View Dialog

When you test a typical system, MetaStock keeps track of tens of thousands of test details. This information is stored in a series of reports. Each of the reports provides different information about the test.

- The Summary Report provides a brief summary of the system tests.
- The Orders Report lists all the potential orders that were considered and gives details about them.
- The Positions Report shows details about every position that occurred during the test.
- The Equity Report shows details about the test's account from the beginning of the test to the test's end.
- The System Report lists all the information the system used, including all the options you can change.

Summary Report

This report provides a detailed analysis of how a security performed with a given system. It includes several categories of information, described below.



Summary. Lists the security tested, the system used, the date and time the test was run, the number of bars included in the test and the date range tested.

Performance

Profit - How much money this stock earned when traded with the selected system. If this is a negative number, it indicates a loss.

Performance - A percentage measure of how much profit or loss the system generated based on its initial equity. For example, if you start with $1000 and you end up with $1100 performance is 10%.

Annualized Performance - Calculates what the Performance described above would be if the simulation took one year. This value is reached by dividing a year (365 days) by the number of days in the simulation, then multiplying that number times and the performance.

Buy & Hold Profit - The profit resulting from a buy and hold strategy. A buy and hold strategy assumes that you buy on the first day loaded in the chart and hold the position. The profit is calculated by using the price on the first day and the price on the last day. Entry commissions are taken into account.

Buy & Hold Performance - The percentage difference between the initial equity and the final equity if you were to buy the first bar and sell the last. It's just like Buy & Hold Profit (described above), but it's expressed as a percentage.

Buy & Hold Annualized Performance - Shows how much the system would have made or lost if they bought on the first day of the year and sold on the last day of the year.

Trade Summary

Total Trades - The total number of trades generated by the test.

Note: This number only shows closed trades and does not include the open position that may have existed at the end of the test. Therefore, it is possible for this value to be zero if there was a single unclosed trade in the test.

Trade Efficiency - Your average total trade efficiency. Trade efficiency is the percent of the potential profit your trades realized, and is explained in more detail below.

Average Profit/Average Loss - The test's average profit and average loss.

Profitable Trades

Shows you how many profitable trades you had, and how many were longs and how many were shorts. Also lists your profitable trades' average profit, highest profit, lowest profit and longest consecutive run.

Unprofitable Trades

Shows you how many unprofitable trades you had, and how many were longs and how many were shorts. Also lists your unprofitable trades' average loss, highest loss, lowest loss, and longest consecutive run.

Maximum Position Excursions

Long Favorable - The most profit made by any single long position.

Short Favorable - The most profit made by any single short position.

Long Adverse - The most equity lost by any single long position.

Short Adverse - The most equity lost by any single short position.

Trade Efficiency

The percentage of the total possible profit realized by the trade. There are three types of trade efficiencies: long, short, and total. All three apply to both long and short trades.

Long Trade Entry Efficiency - The highest price minus the entry price, divided by highest price minus the lowest price.

Long Trade Exit Efficiency - The exit price minus the lowest price, divided by highest price minus the lowest price.

Long Trade Total Efficiency - The exit price minus the entry price, divided by highest price minus the lowest price.

Short Trade Entry Efficiency - The entry price minus the lowest price, divided by highest price minus the lowest price.

Short Trade Exit Efficiency - The highest price minus the exit price, divided by highest price minus the lowest price.

Short Trade Total Efficiency - The entry price minus the exit price, divided by highest price minus the lowest price.

Average Entry - The sum of the entry efficiencies for all trades divided by the number of trades.

Average Exit - The sum of the exit efficiencies for all trades divided by the number of trades.

Average Total - The sum of the total efficiencies for all trades divided by the number of trades.

Average Long Entry - The sum of the long entry efficiencies for all trades divided by the number of long entries.

Average Long Exit - The sum of the long exit efficiencies for all trades divided by the number of long exits.

Average Long Total - The sum of the long efficiencies for all trades divided by the number of long trades.

Average Short Entry - The sum of the short entry efficiencies for all trades divided by the number of short entries.

Average Short Exit - The sum of the short exit efficiencies for all trades divided by the number of short exits.

Average Short Total - The sum of the short efficiencies for all trades divided by the number of short trades.

Performance Indices

Buy & Hold Index - This index shows the percentage of the system's profits as compared to a buy and hold strategy's profits. A value of "-50" means that the system's profits were one-half (i.e., 50%) of the buy/hold's. A value of "25" means that the system's profits were 25% greater than the buy/hold's. A value of "0" means they were equal.

Ideally you want your system test to produce higher profits than a buy/hold strategy (i.e., Buy/Hold Index is greater than zero); otherwise the trading may not be worth the time and effort.

Profit/Loss Index - This index compares the Amount of Winning Trades to the Amount of Losing Trades. The Profit/Loss Index combines Winning Trades and Losing Trades into one value that ranges from -100 (worst) to +100 (best). A negative index value indicates that the trading system produced a net loss. The higher the index value, the higher the Amount of Profitable Trades compared to the Amount of Losing Trades.

Index	Profit/Loss
+100	High Profits/No Losses
+50	Profits > Losses
0	Profits = Losses
-50	Profits < Losses
-100	No Profits/High Losses

Reward/Risk Index - This index compares risk to reward. In this index, risk is defined as the *System Open Drawdown* (Example: the lowest point of the equity line below the initial investment). *Reward* is defined as the Total Net Profits (that is, the final point on the equity line).

The Reward/Risk Index combines Reward and Risk into one value that ranges from -100 (riskiest) to +100 (safest). A Reward/Risk Index value of zero means that risk and reward exactly offset each other.

Index	Reward	Risk
+100	High	None
+50	Medium	Medium
0	None	None
-50	Low	Medium
-100	Very Low	High

Accounting

Initial Equity - The amount of hypothetical money the system started with.

Trade Profit - How much equity all the profitable trades earned.

Trade Loss - How much equity all the unprofitable trades lost.

Commissions - How much you paid to execute all the trades generated by the system.

Interest Credited - The amount of interest the system's account earned during the test.

Interest Charged - The amount of interest the system paid for borrowing money during the test.

Open Positions - The dollar value for any positions still open at the test's end.

Final Equity - How much equity existed at the end of the test.

Account Variation

Highest Account Balance - The greatest equity present during the test.

Lowest Account Balance - The lowest value of the cash account.

Highest Portfolio Value - The most your open positions were worth simultaneously during the test.

Highest Open Drawdown - The largest equity dip (relative to the initial investment) based on open positions. This shows the maximum distance the equity line fell below the initial investment when a position was still open.

Highest Closed Drawdown - The largest equity dip (relative to the initial investment) based on closed out positions. This shows the maximum distance a closed-out position fell below the initial investment amount.

Account Events

Shows you how many Margin Calls and Overdrafts occurred during the test.

Profitable Timing - Details, measured in bars, about the length of the profitable trades that happened during the test Average, Longest, Shortest, and Total.

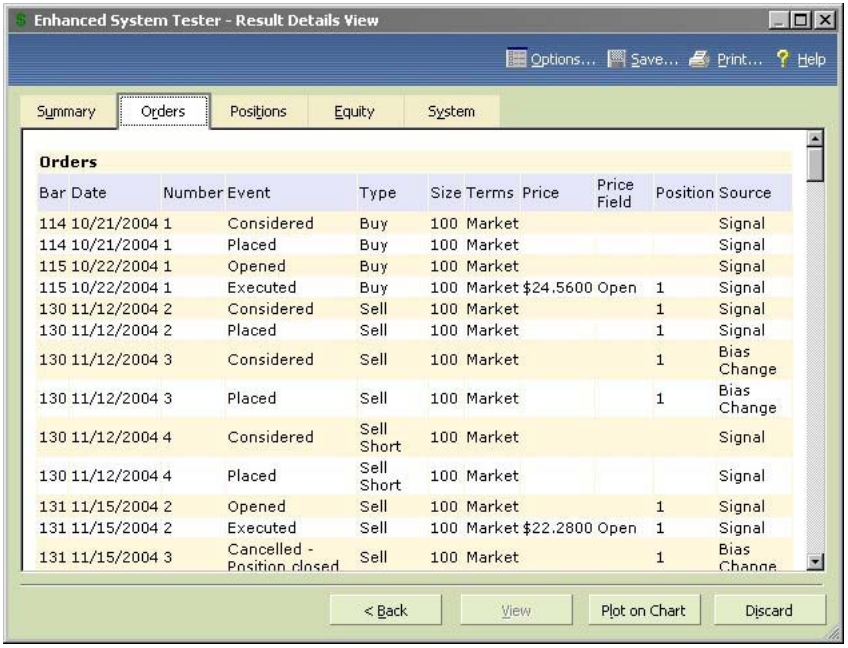
Unprofitable Timing - Details, measured in bars, about the length of the unprofitable trades that happened during the test: Average, Longest, Shortest, and Total.

Out of Market Timing - The Longest and Average number of bars during which the test didn't have any open trades.

Optimization Variables - If you used any optimization variables (OPT1, OPT2, etc.), their values during this test appear here.

Orders Report

The Orders Report shows details about all the trades that were considered, opened, executed or cancelled.



There are eleven columns in the Orders Report:

Bar. This number indicates on what bar the activity occurred, based on the first date of the date range used when the simulation was run. For example, if this number is 6, the corresponding activity happened on the sixth bar of the tested data.

Date. Tells you the date when the activity occurred.

Number. Tells you when this order happened, consecutively. If this number is 4, this order was the fourth order to happen in the test.

Event. Each order can involve several events. This column tells you what events occurred in each trade. Events include Considered, Opened, Placed and Executed.

Type. The type of order being considered, opened or executed. Types include Buy to Cover, Buy Long, Sell Long, Buy Short, and Sell Short.

Size. How many shares the order is considering, buying or selling.

Terms. Indicates if the order is Money Market or Margin.

Price. What the security's price was when the corresponding event occurred.

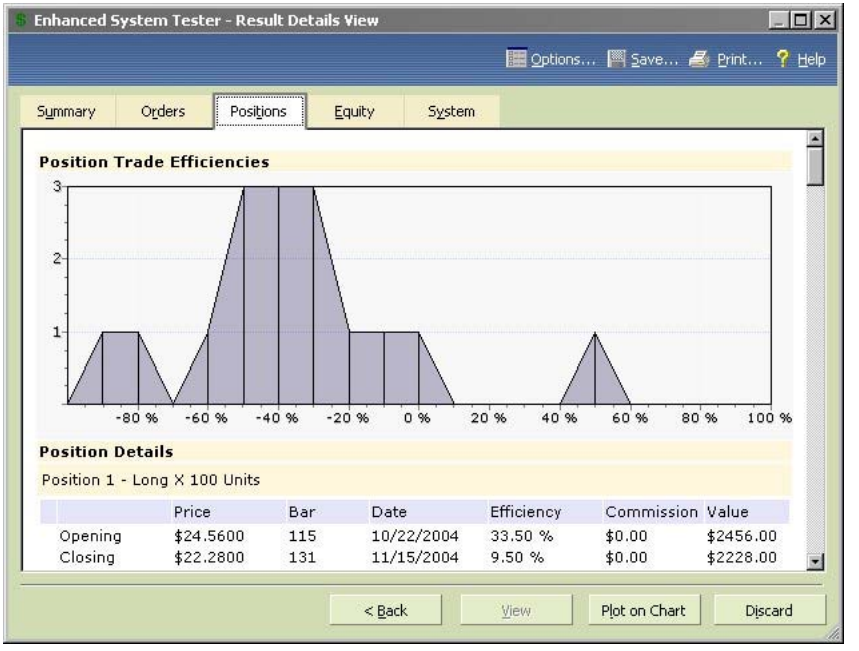
Price Field. Displays which price field the order was executed on.

Position. Displays a number that maps to the Positions Report. This is helpful when you have more than one position open at a time.

Source. What initiated the order. Possible sources are Signals, Stops, Margin Call, Last Bar, and Bias Change.

Positions Report

This report summarizes details about each position that occurred during the test, starting with whether the position was long or short and how many units it traded. The graph at the top of this report represents the distribution of trade efficiency over all of the profitable trades that occurred in this simulation. Basically, if all the peaks appear to the right of zero, the system is well tuned. If all the peaks appear to the left of zero, the system is poorly tuned.



The rest of the information is organized in categories, described below.

Opening

Price - The security's price when the position was opened.

Bar - The position opened on this bar.

Date - The position opened on this date.

Efficiency - This is the percentage of possible profit this position made. For example, say you bought a stock for $10. If the stock fluctuates between $20 and $10 while the position is open, and you sell at $15, your efficiency is 50%. If you sell at $20, your efficiency is 100%.

Commission - How much your broker charged to place the order.

Value - What the securities in the position were worth when they were bought, plus commission.

Closing

Price - The security's price when the position was closed.

Bar - The position closed on this bar.

Date - The position closed on this date.

Efficiency - This is the percentage of possible profit this position made. For example, say you bought a stock for $10. If the stock fluctuates between $20 and $10 while the position is open, and you sell at $15, your efficiency is 50%. If you sell at $20, your efficiency is 100%.

Commission - How much your broker charged to place the order.

Value - What the securities in the position were worth when they were sold, plus commission.

Most Favorable

Price - The best price the security reached during the test (highest for long positions, lowest for short positions).

Bar - The bar in which the most favorable price occurred.

Profit - How much money the position would have earned if it had closed with the most favorable price.

Most Adverse

Price - The worst price the security reached during the test (lowest for long positions, highest for short positions).

Bar - The bar in which the most adverse price occurred.

Profit - How much money the position would have lost if it had closed with the most adverse price.

Equity Report

The Equity Report includes a graph displaying the account's equity during the test. The numbers across the bottom of the graph indicate bars. More account details appear in the table below the graph.

Those details are described here:

Bar. The bar in the test that corresponds to the rest of the information on that row.

Date. The date on which the bar and its equity account information occurred.

Cash. The equity account's balance.

Reserved. Money set aside for orders that aren't executed immediately, like limit, stop, and stop limit orders. The Reserved column also includes funds held in the maintenance margin.

Margin. The total amount of funds borrowed from the broker to execute margined trades.

Overdraft. If the account is overdrawn, this is the overdraft amount.

Portfolio. The value of all the securities in an open position.

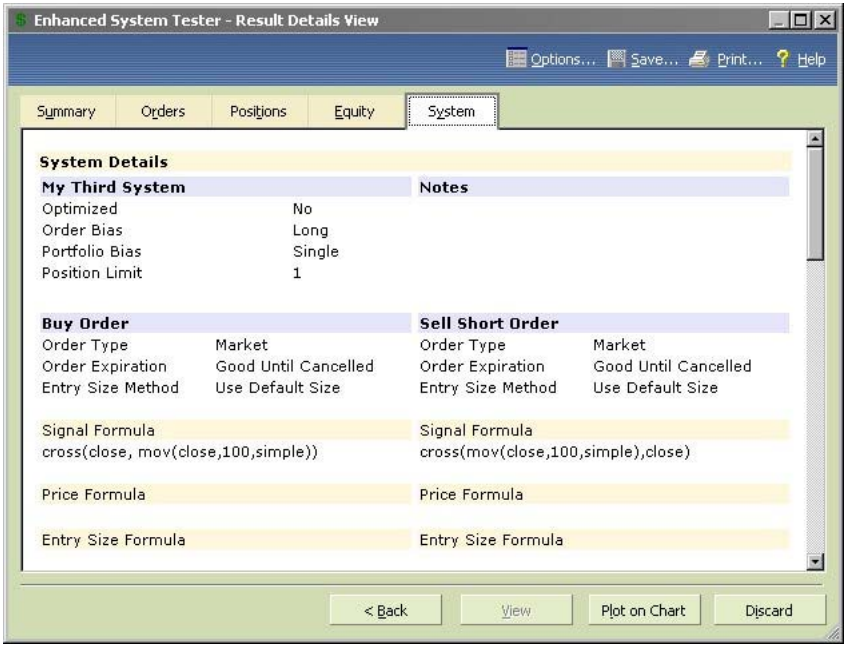
Interest. How much interest the test's equity earned during this bar.

Commissions. How much money was paid in commissions for this bar.

Total Equity. The value of the entire equity account during this bar.

System Report

The System Report summarizes all the details about the system that was tested, including all the options you selected during the New Simulation wizard (page 514).



Printing Reports

You can print the reports generated by system tests by clicking the **Print** button on the report.

Name. Choose the desired printer from the drop-list.

Print Range. Choose All to print the entire report. The Pages radio button is always disabled.

Print to File. Check this box to send the printer output to a specified filename. The file can be directed to the printer at a later time by right-clicking on the filename in the Microsoft Explorer and choosing Print.

Copies. Type the number of copies to print.

Collate Copies. Separates each page of the document when printing multiple copies (if the printer supports this feature).

Copying Reports to the Windows Clipboard

You can copy the contents of a system test report to the Windows Clipboard for use in other Windows applications.

To copy a report to the clipboard

1. Display a report.
2. Right-click anywhere within the report and choose Select All from the list.
3. Right-click again and select Copy

Optimization

Optimizing a system involves performing multiple tests while varying one or more parameters within the trading rules or stops.

The Enhanced System Tester Tutorial (page 494) gives an example of optimizing the number of time periods used to calculate a moving average in a simple trading system. In that example, tests are run using 10- to 50-period moving averages, by 5-period increments. We recommend that you go through this tutorial to more clearly understand the principle of optimization.

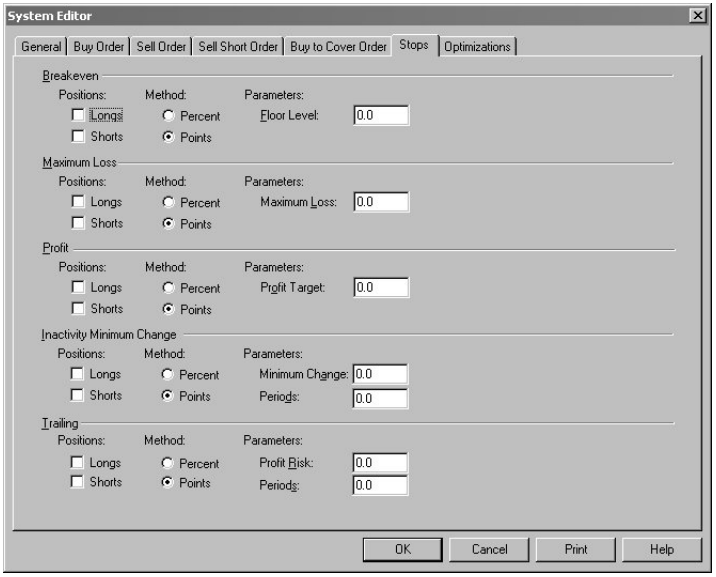
Each trading system can have up to 10 optimization variables (referred to as OPT1 through OPT10). (The OPT variables are not valid in custom indicators.) To optimize a system, you replace

numeric constants within the trading rules or stops with OPT variables.

The following is an example of an OPT variable specified within a trading rule. In this rule, “opt1” replaces the time period parameter in the moving average function.

```
C > Mov(C,opt1,E)
```

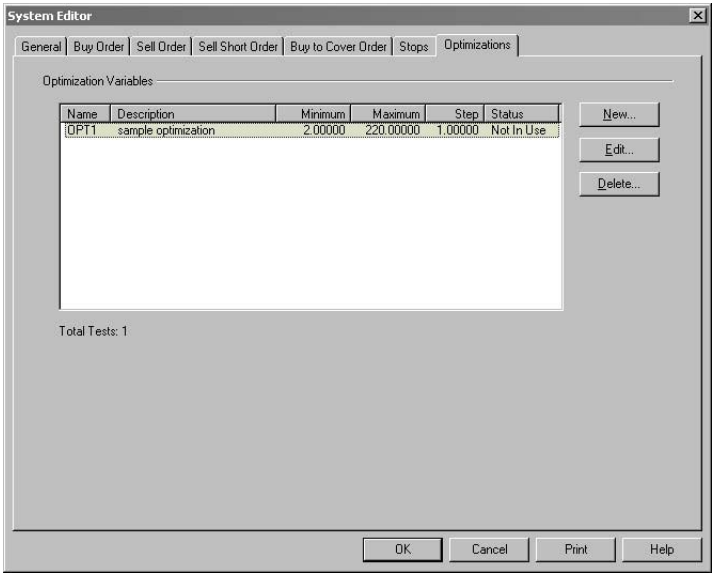
OPT variables specified for a stop are placed directly in the Parameters section of the Stops dialog.



You then specify the OPT variable’s range (minimum, maximum, and step). When you test a system that contains OPT variables, MetaStock will automatically perform multiple tests using each of the possible optimization combinations.

Specifying the Optimization Variables

To specify the ranges for the optimization variables in your trading rules or stops, click the Optimization tab in the System Editor dialog.



New. This lets you add a new OPT variable and edit its properties.

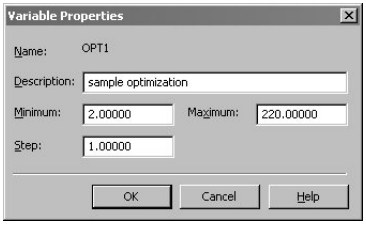
Edit. Displays the Variable Properties (page 533) where you can edit the minimum, maximum, and step of the selected OPT variable.

Delete. Deletes the selected OPT variable. Note that you cannot delete an OPT variable that is in use.

Total Tests. Displays the total number of tests that the optimized system test will perform.

Variable Properties Dialog

The Variable Properties dialog is used to specify the range of the OPT variables.



Name. This shows the OPT variable you are editing.

Description. You can enter an description of the variable in this box.

Minimum. Type the minimum value for the OPT variable.

Maximum. Type the maximum value for the OPT variable.

Step. Type the step size by which to increment the OPT variable. For example, if the minimum/maximum range was 10 to 50 and the step size was 10, the OPT variable would be replaced with the values of 10, 20, 30, 40, and 50.

Example Optimizations

The following Buy Order trading rule buys when the close is above a 10-period moving average:

```
Buy Order:CLOSE > mov(CLOSE, 10, SIMPLE)
```

If you don't know the optimum number of time periods to use for the moving average, you could replace the "10" in the above rule with an optimization variable as shown below:

```
Buy Order: CLOSE > mov(CLOSE, OPT1, SIMPLE)
```

The range for OPT1 (e.g., 5 to 20 by steps of 5) is specified by selecting the Optimizations tab from the System Editor dialog. When you test this system, MetaStock will perform multiple tests, each time replacing the OPT1 variable with the next optimization value (as shown below).

```
Buy Order:CLOSE > mov(CLOSE, 5, SIMPLE){Test #1)
Buy Order:CLOSE > mov(CLOSE, 10, SIMPLE){Test #2)
Buy Order:CLOSE > mov(CLOSE, 15, SIMPLE){Test #3)
Buy Order:CLOSE > mov(CLOSE, 20, SIMPLE){Test #4)
```

After testing this system, there will be four reports (one for each optimization value).

When optimization variables are used, the number of tests required to test every combination of optimization values can be determined by multiplying the number of tests for each OPT variable together. The following example demonstrates the use of multiple optimization variables:

```
Buy Order:rsi(14) > OPT1

Sell Order:rsi(14) < OPT2

Sell Short Order:rsi(14) < OPT2

Buy to Cover Order:rsi(14) > OPT1
```

This translates as:

OPT1: minimum = 20, maximum = 40, step = 10 {3 tests}
OPT2: minimum = 70, maximum = 80, step = 10 {2 tests}

In the above example, OPT1 has three possible values (i.e., 20, 30, and 40) whereas OPT2 has two possible values (i.e., 70 and 80). This

combination requires that six (three multiplied by two) tests be performed as shown below:

Test #	OPT1	OPT2
1	20	70
2	30	70
3	40	70
4	20	80
5	30	80
6	40	80

The number of tests can quickly grow enormous. For example, consider the following moving average crossover system:

```
Buy Order:cross(C, mov(C, OPT2, E))
Sell Order:cross(mov(C, OPT1, E),C)
Sell Short Order:cross(mov(C, OPT1, E),C)
Buy to Cover Order:cross(C, mov(C, OPT2, E))
```

This translates as:

OPT1: minimum = 1, maximum = 100, step = 1 {100 tests}

OPT2: minimum = 1, maximum = 100, step = 1 {100 tests}

In the above example, OPT1 and OPT2 each have 100 possible values. This combination requires 10,000 (100 multiplied by 100) tests to be performed! Even on a fast computer, this relatively simple (yet heavily optimized) system may take hours to test. A more appropriate method to optimize this system would be to decrease the ranges and/or increase the steps to reduce the number of tests.

System Development Tips

Developing *profitable* trading systems is difficult. Even after many years of experience with systems development, we still find ourselves getting sidetracked on the wrong system. Here are some of the tips we've learned.

Is Testing/Optimizing Valid?

One of the most common mistakes made in system testing and optimization is over-fitting the trading rules to a specific set of data. Before you get too excited when you think you've found the "holy grail" of trading systems, check the following.

- Check the equity line (see page 537). It should gradually slope upward. Abrupt spikes indicate inconsistent profits.
- Test the system on different time frames. The results should be similar to those on the original data tested.
- Test the system on different securities, across different industries.
- Optimize again using only half of the original data tested. Then test the remaining data using the optimum values. If the system is valid, the results of the two tests should be similar.
- Test the system on different types of markets (e.g., upward trending, downward trending, and sideways). A good system should work in all types of markets, since you won't always know when a market changes from trending to trading or vice versa.
- Remember that human expectations control the prices of securities. Therefore, it may not be realistic to expect a mechanical system to consistently predict changes in their expectations. We suggest you use trading systems in conjunction with other investment analysis techniques.

Commissions

Pay close attention to the number of trades generated by a system test. If there are a large number of trades and large profits, be sure you specified realistic commissions. The results of the test may be much different once commissions are factored in.

Winning Trades Versus Losing Trades

It is easy to be too concerned with the number of winning versus losing trades. Although this can be important, you should also pay attention to the Average Profit compared to the Average Loss (from the Summary Report, see page 521). Some good systems generate more losing trades than winning. This can happen if the average winning trade is much higher than the average losing trade.

Interest

If your system specifies that interest is earned when you are out of a trade (page 525), optimization may lead you to the system that is out of the market the most. This means that a system test that lost on every trade could turn out to be the best system, if it was out of the market more than the other tests.

This is easily witnessed by setting the Money Market interest rate very high (e.g., 100%) in the System Testing Options dialog and then optimizing.

The Zig Zag and Lastvalue() Trap

The Zig Zag indicator (page 280) uses 20/20 hindsight to filter out fluctuations. It shows only price movements that are equal to or greater than the amount specified. However, the Zig Zag indicator determines this "after the fact" (an advantage a trader doesn't have). With that said, be careful about using the Zig Zag indicator in a system test. It will produce results that are not attainable in real trading.

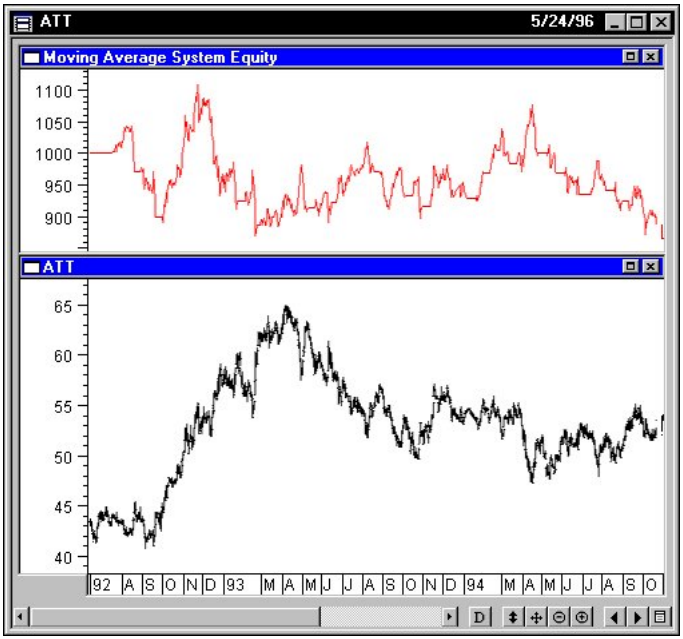
The `lastvalue()` function (page 453) can see into the future in that it returns the last value of a data array. For example, a system test could be written that bases a trade on a future price or indicator value—something unattainable in real life. Although it has value for things like pattern recognition, it should rarely (if ever) be used in a system test, as it will provide the system test with unattainable information.

Using The Equity Line

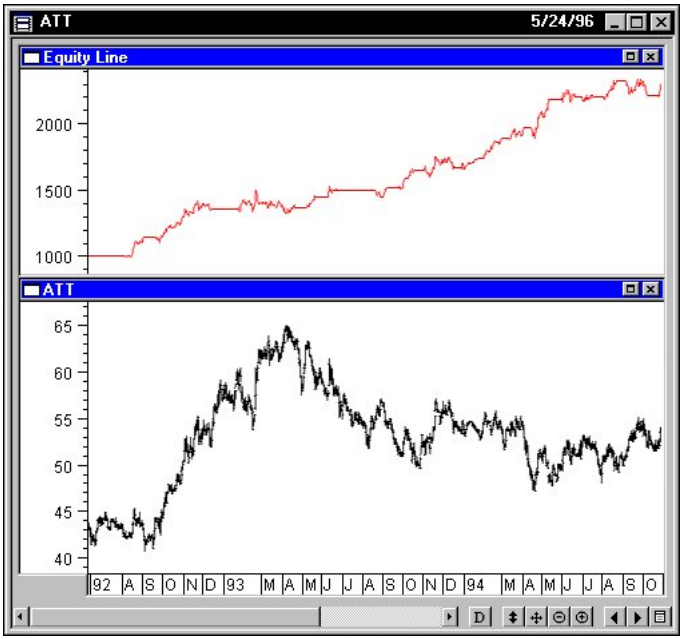
The equity line is a valuable tool. A quick glance at the equity line can show a lot about the performance of a trading system.

The ideal equity line should slope upward. Large spikes may indicate that the system is inconsistent and risky. A system that generates huge profits on one trade (e.g., it was short during the crash of 1987) is uncertain at best.

The following is an example of the effects on an equity line by a system test which generated very erratic (volatile) profits. A system that generates these results should be avoided.



The following is an example of an equity line that has a consistent upward slope.



This is the type of results a good system generates.

Use the Cut/Copy/Paste Commands

To speed the writing of system tests, you may find the Cut/Copy/Paste helpful (page 11). More often than not, trading rules within a system are very similar except for the operators. Consider the following trading rules for a simple moving average crossover.

```
Buy Order: c > mov(c, 39, s)
```

```
Sell Order: c < mov(c, 39, s)
```

Note that the only difference between the two rules is the operator (i.e., **>** and **<**).

Instead of typing both rules, you could type the Buy Order rule, block it (SHIFT+RIGHT ARROW), copy it (CTRL+C), and then paste it (CTRL+V) in the Sell Order text box. Of course, the real usefulness of cut and paste comes when you are entering much longer rules than the ones illustrated above.

Technical Reference

This section explains technical details relating to the system testing process.

General

During the testing process, a system is always in a long, short, or an out position.

The current position is determined by the following:

- the system's trading rules (page 543)
- the optimization values (page 513)
- the stop settings (page 510)

During the testing process, MetaStock keeps track of numerous (typically tens of thousands) of pieces of information dealing with the transactions.

Commissions

When reviewing system test results, remember that commissions are deducted from your equity account when you enter a position, and from your profit when you exit a position (assuming it's profitable).

For example, if you buy 100 shares of a stock valued at $10 per share, and your entry commission is $20, $1020 is deducted from your equity account. If you sell those shares when the stock reaches $20 per share, and your exit commission is $30, your profit is $970 ($1000 minus $30).

Margin Requirement

The Margin Requirement field in the System Testing Options dialog (page 504) specifies the percent of funds that you must deposit in order to place a trade. This allows you to leverage your transactions.

For example, if you trade a security with a 20% margin requirement (i.e., where you are required to deposit only 20% of the actual cost of the security), then a 10% move in the security's price will create a 50% gain. Consider the following example.

If the initial equity was $1,000 when a long position was entered, and the security's price increased 10% before the long position was exited, the profit would normally be $100 (i.e., 10% of $1,000). However, if you place this trade using a 20% margin requirement, then you are able to buy $5,000 worth of the security (your $1,000 is the 20% margin requirement, plus $4,000, or 80%, of borrowed funds). Thus, the 10% increase in the security's price would create a $500 dollar gain (i.e., 10% of $5,000). This $500 gain represents a 50% gain on your $1,000 investment.

Earning Interest

When neither a long nor a short position is open (i.e., an "out" position exists), interest is earned on the equity balance at the interest rate specified in the System Testing Options dialog (page 504).

When a long or short position is opened following an out position, the interest earned during the out position is posted to the equity balance.

Other Accounting Issues

If the equity ever drops to, or below, zero (dropping below zero is only possible when commissions are specified using points rather than percentages), no interest can be earned and no trades can be entered for the remainder of the test.

Note: This does not apply to "points only" system tests.

When a Strategic Delay is specified (page 510), all other signals and stops are ignored until the delay period has passed.

Testing Futures and Commodities

System testing on futures and commodities is done by performing a "points only" system test. A points only system test simply means to ignore any currency values and only track the number of "points" gained/lost.

To perform a **points only** system test, check the Points Only box in the System Testing Options dialog (page 504) before running the test. The initial equity, margin requirement and annual interest rate are ignored when a points only test is performed.

When performing a points only test, the Enhanced System Tester will allow the equity line to drop below the zero line.

Stop parameters can still be expressed in points or percent when performing a points only system test. Percent value calculations will be based on the entry price for a trade rather than the equity level when the trade was entered.

In a points only test, commissions are calculated only under the following conditions:

- The "Points" option in the System Testing Options dialog must be selected.
- The commission value must be less than or equal to 1.
  The commission value should be entered in the equivalent number of points. For example, if your commission rate is $30.00 and a one-tick move on the future you are testing is 0.03125 (or $31.25 per contract), you would enter 0.03 ($30.00 point equivalent) for the commission rate.

Speed

System testing involves a huge amount of processing, so obviously a faster processor in your computer will result in quicker results.

A large amount of testing time is spent writing reports to disk. Thus you can decrease the time it takes to perform tests by using a faster hard disk.

Disk Space

System tests can generate a very large amount of data, all of which gets stored on your computer's hard disk. To minimize the amount of space taken up by system test results, you should discard tests you don't need, and run the Cleanup Wizard (page 505) periodically.

Input() Function, Variables, and Multi-plot Indicators

The Enhanced System Tester will accept assigned variables in the trading rules. For example, the following is a valid Sell Order rule:

```
myvar:=10;
c>mov(c,myvar,s);
```

A system test cannot use the input() function directly (page 451). This function is reserved for custom indicators only. However, if a rule uses the fml() function (page 446) to call the results of a custom indicator, and the custom indicator uses the input() function, the fml() function will only use the assigned default input value—the Enhanced System Tester will not prompt for input.

If a system test contains or references (using the fml() function) a multi-plot indicator, only the last plot is used in the calculation of the system test.

Trading Rule Syntax

Trading rules are entered using the MetaStock formula language (page 415). This syntax is very similar to the syntax used to enter formulas in spreadsheets. Each trading rule may contain up to 1024 characters.

- A trading rule always returns a “true” or “false” signal. When the trading rule condition is true, the corresponding trade (e.g., buy, sell, etc.) is taken. When the condition is false, no action is taken.

  The following example illustrates a trading rule:

  ```
  Buy Order:cross(CLOSE, mov(CLOSE,12,Simple))
  ```

  If this were entered as the Buy Order rule, the system would enter a long position when the close crossed above a 12-period moving average of the close.

  Similarly, the following trading rule would be triggered if the MACD is greater than zero. (The “macd()” in this rule is a function; see page 455 for details.)

  ```
  Buy Order:macd() > 0
  ```

- All custom indicator functions (e.g., macd()) can be used in trading rules. A specific custom indicator can be referenced using the fml() formula (page 446) as shown below:

  ```
  Sell:  fml("My Formula") > 0
  ```

- You can combine multiple functions within a trading rule using the AND and OR operators as shown below. For more information on using AND and OR operators, page 446.

  ```
  Buy Order:macd() > 0 AND CLOSE >
  mov(CLOSE,12,S)
  ```

  The above rule requires that the MACD be above zero *and* that the close be above its 12-period moving average.

  The following rule uses the OR operator to generate a trade when the MACD falls below zero, *or* when the close falls below its moving average.

  ```
  Sell Order:macd() < 0 OR CLOSE <
  mov(CLOSE,12,S)
  ```

- You can click the **Functions** button (page 420) when editing the trading rules (you must be editing the trading rules, not the name or notes). The Paste Functions dialog with a list of the available functions will then be displayed. Double-clicking on a function name will insert the function into the trading rule at the current cursor location.
- Trading rules may be left blank. However, blank rules never generate trades.

- Multiple ANDs and ORs can exist within a trading rule. The best way to control the precedence (i.e., the order of operation) of multiple ANDs and ORs within a trading rule is by using parentheses as shown in the following trading rule:

  ```
  Buy Order:(macd() > 0 AND C > 100) OR H-L>5
  ```

  The preceding trading rule will generate a trade when either of the following conditions are met:

  - The MACD is above zero *and* the close is above 100 (i.e., both of these conditions are met).
  - The high minus the low is greater than five.

- Trading rules may only access the security's price data (e.g., high, low, close, etc.) and custom indicator functions (page 423). Trading rules may not reference the trading system itself (e.g., the number of days since the last trade). However, several of the stops (page 510) perform this functionality.

Note: A special variable called the "P" variable can be used to reference any selected price or indicator plot. For more information on the "P" variable, see page 429.

- Variables can be used within the rules of a system test (page 425). Multiple plot formulas (i.e., those that would result in multiple plots if plotted as a custom indicator) are allowable, but only the last one will be recognized by the Enhanced System Tester.

Using the Alert() Function

The alert() function (page 437) is used in conjunction with other functions to extend a true signal for a specified number of periods. The signal is held true over the specified number of periods even if another trade is generated.

The following example illustrates the use of the alert() function:

```
Buy Order:RSI(14) < 30 AND alert(VOLUME > 500,3)
```

If this were entered as the Buy Order rule, the system would enter a long position when the RSI was less than 30 and the volume had been greater than 500 at any time *over the previous three time periods*. The "VOLUME > 500" condition holds true over the entire three time periods even if the volume drops below 500 during that three period time span.

If you removed the alert() function in the above example, both conditions (i.e., RSI(14) < 30 and VOLUME > 500) would have to be true *simultaneously* in order for the Buy Order signal to be generated. By using the alert() function, a true condition generated by the "VOLUME > 500" condition is extended over a three period time span.

Ranking and Screening Securities

What is The Explorer?

The Explorer is a powerful, multipurpose analysis tool that can perform in-depth "explorations" on multiple securities across multiple folders. The Explorer can perform a number of unique tasks, including comparing, filtering, listing multiple indicator values for multiple securities, ranking, searching, showing securities with current "buy/sell" signals, sorting, etc.

You can use The Explorer to do such things as:

- Discover which securities have just generated a "buy" (or "sell") signal.
- Discover the securities that have just crossed above their 200-day moving average on increased volume.
- Discover which securities rank highest by Wilder's RSI.
- Discover which securities are above their 10-week moving average, with a Stochastic of 80 or higher, and are at a level of four on a customized binary wave.
- Generate a performance report of all your mutual funds.
- Generate a list of every security along with the values of your favorite six indicators for each security.
- Copy only those securities which meet your personal criteria from the MetaStock Data CD to your hard drive for updating.
  …and more.

This is just a small sampling of what The Explorer can do for you.

IMPORTANT: Due to the inherent complexity in the design and creation of custom indicators, trading systems, explorations, and experts, Equis cannot provide support over the phone for this process. However, support is available through email. The `Formula Help.doc` file, found in the MetaStock folder, is a sample request form you can use when requesting this service. Complete the form in detail and email it to *formulas@equis.com* or submit a request via the Equis web site under **Customer Zone | Trading Resources | Custom Formulas**. This service is usually free, but we reserve the right to charge a fee for extensive development.

The rules and criteria that define this process are called an "exploration." For each exploration, you can specify from 1 to 12 columns plus a "filter". The criteria that define the columns and filter are written in MetaStock's formula language (see page 415). A list of securities can be screened for those candidates that meet your criteria by applying a filter. A report showing the results of an exploration can be viewed on screen or printed.

The Explorer is designed to be simple and straightforward, yet extremely powerful. By combining the MetaStock formula language and Enhanced System Tester syntax, designing an exploration is just a matter of using the skills you may already possess. You will find the MetaStock formula language section (see page 415), the Indicator Builder Tutorial (see page 282), and the Enhanced System Tester Tutorial (see page 494) helpful in getting you up to speed.

Caution: Please note that the performance of The Explorer is significantly slower when exploring intraday data while collecting real-time data. Therefore, you may want to wait until after market hours to run explorations on intraday data.

Before you attempt to write your own explorations, we encourage you to take a few minutes to go through the following short tutorial. Doing this will provide you with a solid foundation on which to build your skills.

The Explorer Tutorial

This tutorial provides a brief introduction to the process of creating an exploration and viewing the resulting reports. It is important that you follow this tutorial before you create your own explorations. You should also be familiar with the syntax used by the Indicator Builder (see page 281) and the Enhanced System Tester (see page 503).

Quick Start (The Basics)

In its simplest form, creating an exploration involves the following steps:

1. Choose **Tools>** The Explorer from the menu.
2. In the Explorer dialog click **New**.
3. Fill out the Exploration Editor dialog by typing a name and up to 12 parameter formulas and a filter (if desired) using the MetaStock formula language (see page 415).

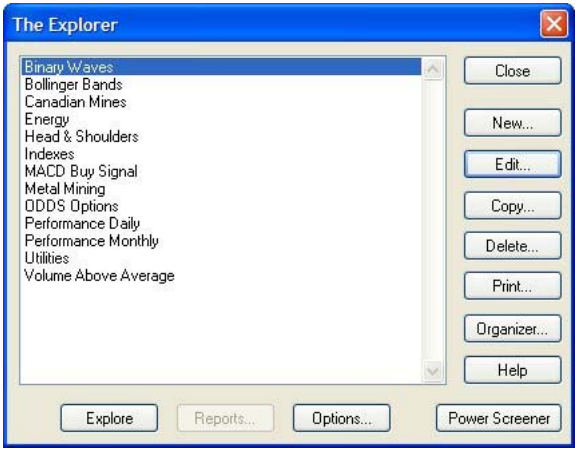
   Note: The column criteria and the filter criteria are independent— one can exist without the other.
4. Click **OK** at the bottom of the dialog and click **Explore** in the The Explorer dialog.
5. Select the folder and securities to explore from the Select Securities dialog, then click **OK** to start the exploration.

That's it! Although there are other features that increase the power of The Explorer, creating an exploration involves just the five steps.

The next several sections of the tutorial provide more details on the five basic steps shown above. Please follow each step carefully, since each step is dependent on the previous one.

The Explorer Dialog

You use The Explorer dialog to create, manage, and print explorations. The explorations listed in your dialog will be different than the ones shown above.

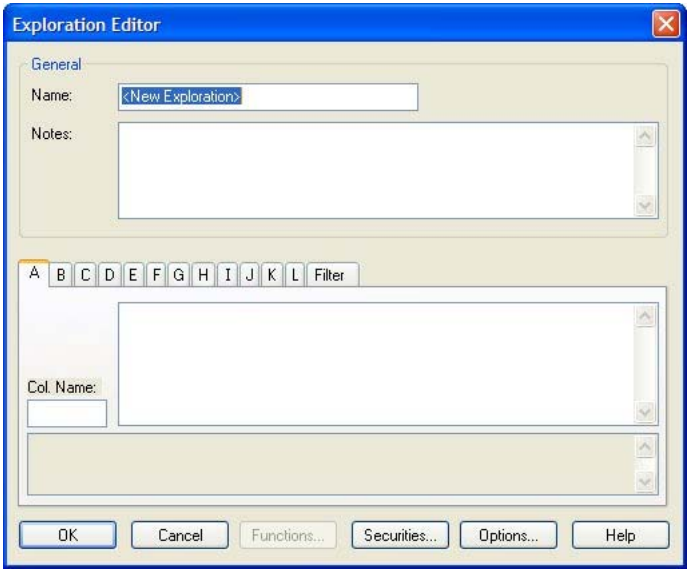


The Explorer button

Choose **Tools>** The Explorer, or click the The Explorer button on the standard toolbar to access The Explorer dialog.

Creating a New Exploration

1. With The Explorer dialog displayed, click **New**.
   The Exploration Editor dialog appears.



The Exploration Editor dialog is the heart of an exploration. You use this dialog to specify the name, column, and filter information.

2. Enter the exploration name as *My First Exploration*.
3. Click the Column A tab and type the following in the box:
   `CLOSE`
4. Type the following into the Column Name box:
   `CLOSE`
   You can enter anything you want for the name. For this tutorial, however, enter the name as shown above.
5. Click the Column B tab and type the following in the box below all the column headings:
   `mov(CLOSE,20,SIMPLE)`
6. Type the following into the Col. Name box:
   `MOV-20`
7. Click the Column C tab and type the following in the box:
   `rsi( 14 )`
8. Enter the following into the Col. Name box:
   `RSI-14`
9. Click **OK** to return to The Explorer dialog.

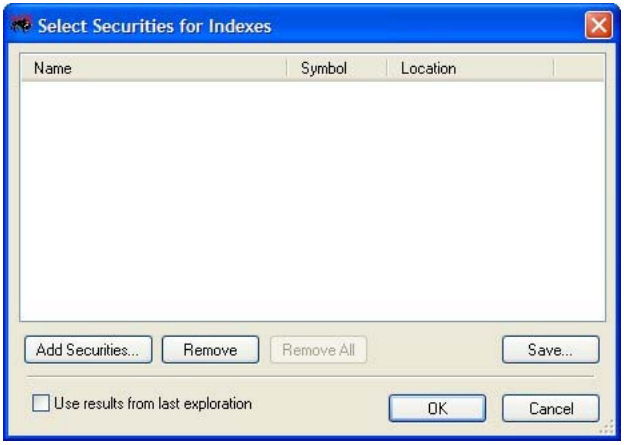
Notes:

- The column formulas use the identical syntax as MetaStock's custom indicators. You can even reference existing formulas by using the `fml()` function (e.g., `fml("MYMACD")`). This saves you from having to retype formulas that you have already defined in the Indicator Builder dialog.
- To paste in a custom indicator formula, click **Functions**. For information on using the Paste Functions dialog, see page 420.

Running a New Exploration

After you have created your exploration, you can use it to find what instruments fit your parameters. To do so:

1. Click **Explore** to begin the exploration.
2. The Select Securities dialog appears, where you choose the securities to explore.

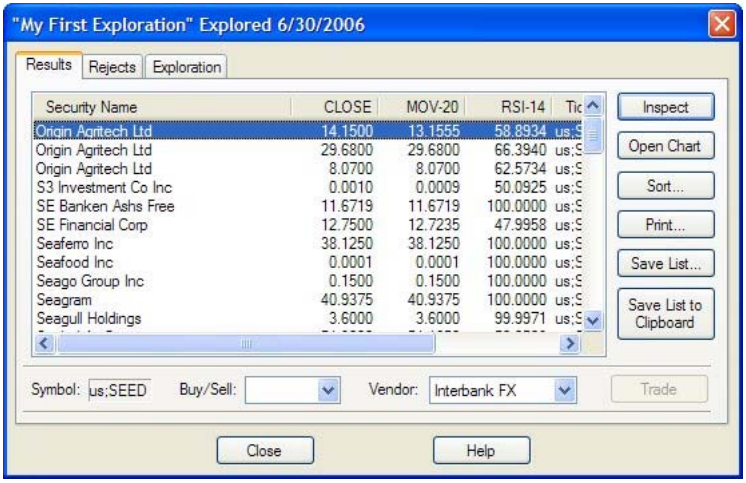


3. Click **Add Securities...** . The Add Securities dialog appears.
4. This dialog looks a lot like the Open dialog (see page 95), and works just like it. You can select one or more local or online securities.
5. Double-click the “Stocks – Common” folder.
6. For this tutorial, select all the stocks that begin with the letter A. (Select the stock at the top of the list, then hold the Shift key and select the last stock on the list that begins with “A”.)
7. Click **Open**.

   For this tutorial, just click **OK**. Every security in the selected folder will be included in the exploration. However, you could have selected specific securities and additional folders.

   As the exploration is being calculated, the Exploration Status window is displayed.

8. When MetaStock has completed calculating the exploration, click **Reports** in the Exploration Completed dialog. A report showing the results will appear.



The Exploration Report dialog shows the name of each security and the calculated results for each of the columns. The values shown in the columns above represent the closing price (i.e. close), a 20-day moving average (i.e., `mov(close,20,simple)`), and a 14-day RSI (i.e.,`rsi(14)`) for the most recent day of data. The sort order can be changed using the Sort command (see page 572).

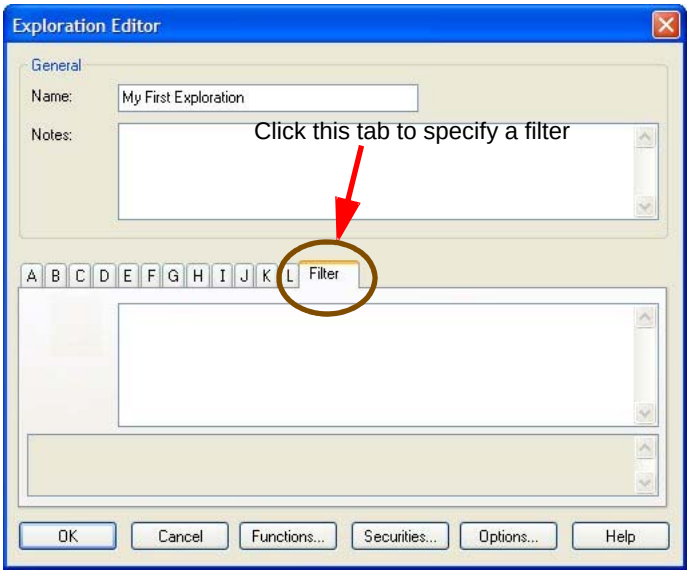
Adding a Filter

A filter narrows your list to securities that meet specific criteria. You can write a filter based on the existing column formulas, or you can write one that is completely independent of the column formulas. In fact, you could write an exploration with the columns left empty with just a filter.

In this tutorial, we will write a filter that lists securities that are below a 20-day moving average and have a 14-day RSI below 40. Since we have already written these two indicators in columns A and B, we can save time by referencing them directly within the filter.

To add a filter

1. Click Close to exit the report.
1. With "My First Exploration" selected, click **Edit**.
2. Choose the Filter tab.



3. Enter the following into the Filter box:
   `(colA < colB ) and (colC < 40)`

   Notice that the filter could also be written as follows:
   `(CLOSE < mov(CLOSE,20,SIMPLE))and(rsi(14)< 40)`

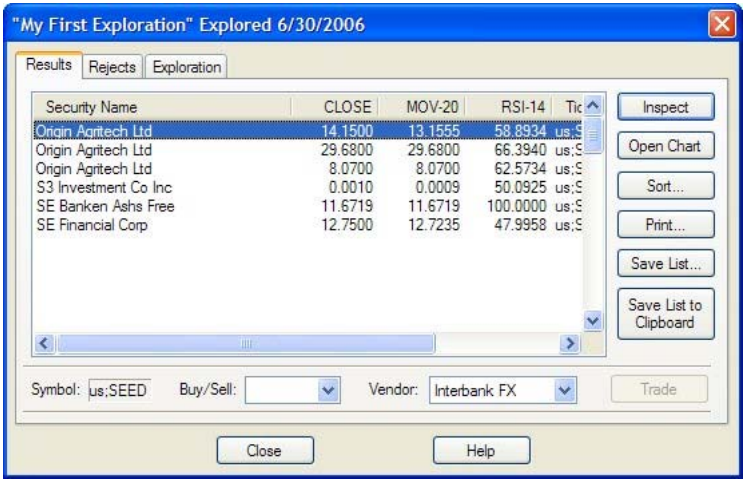
If your filter is based on the column formulas directly (as shown above), you can save yourself some typing by simply referencing the columns using the "`COL`" variable (e.g., `colA` and `colB`). This is particularly handy if the column formulas are long.

The filter formulas use the identical syntax as MetaStock's Enhanced System Tester. You can even reference existing custom indicators by using the `fml("FORMULA NAME")` function (see page 446). For example,`fml("MYMACD")`. This saves you from having to retype formulas that you have already defined in the Indicator Builder dialog.

To reference existing custom indicators

1. Click **Options** in the Exploration Editor dialog.
   a. Check the Use Filter box in the Exploration Options dialog to enable the filter.
      For the filter to take effect, this box must be checked.
   b. Click **OK** to exit the Exploration Editor dialog.

2. To perform the exploration with the newly added filter, click **Explore**.
3. When MetaStock has finished calculating the exploration, choose Reports from the Exploration Completed dialog. A report showing the results will appear.



Note: Only those securities that are below their 20-day moving average and have a 14-day RSI less than 40 will appear in the Results report.

If you wanted to narrow the list down even further, you could go back to the Exploration Editor dialog and make the filter more restrictive:

To make a filter more restrictive

1. Click **Close** to exit the report.
2. With "My First Exploration" selected, click **Edit**.
3. Make the filter more restrictive by editing the filter box to appear as follows:
   ```
   (colA < colB) and (colC < 30)
   ```
4. Click **OK** to return to The Explorer dialog.
   To perform the exploration with the more restrictive filter, click **Explore**.
5. When MetaStock has finished calculating the exploration, click **Reports** in the "Exploration Completed" dialog. A report showing the results will appear.

Note: The number of securities appearing in the report is probably less than the last report, since you made the RSI portion of the filter more restrictive.

To display a report showing the historical column values for a security, select a security in the Results report and click **Inspect**.

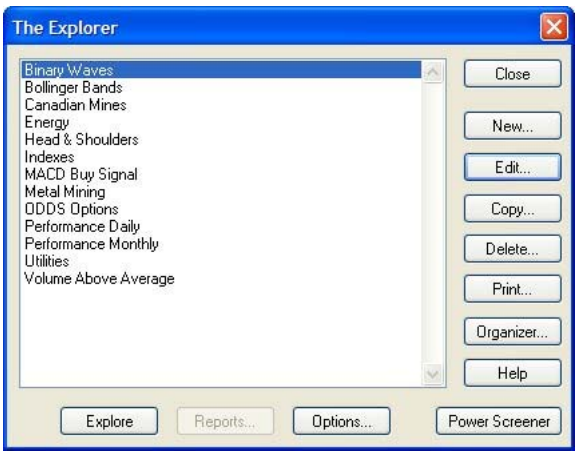
Tutorial Summary

- The Explorer provides tremendous power and flexibility by giving you a multipurpose analysis tool that lets you perform in-depth explorations of your securities.
- An exploration is comprised of columns and/or a filter. Although they are entered in the same dialog and can be combined in a single exploration, the columns and filter are separate and distinct functions.
- For each exploration, you can specify from 1 to 12 columns plus a "filter". Blank columns are ignored.
- Column formulas and filter rules are written with the MetaStock formula language (see page 415). They can reference existing custom indicators using the `fml()` function (e.g.,`fml("My MACD")`).
- A filter can reference the column formulas directly using the `COL` variable (e.g., `colA`).
- The results of an exploration are shown in the Results report (see page 570). Each security along with the designated column values are displayed in the specified sort order.
- Historical column values for individual securities can be displayed by clicking **Inspect** in the Results report.

The Explorer Dialog

The Explorer button

The Explorer dialog is displayed by choosing The Explorer from the Tools menu or clicking The Explorer button on the standard toolbar. The Explorer dialog lists the names of all your explorations. You can create up to 1,000 explorations. The selected exploration can be edited, copied, deleted, printed, and tested. Explorations that have an "R" next to the name have reports available from the most recent exploration.



New. Click this to display the Exploration Editor dialog in which you can specify the name, columns, and filter for a new exploration. For more information on creating new explorations, see page 558.

Edit. Click this to display the Exploration Editor dialog in which you can edit the selected exploration.

Copy. Click this to make a copy of the selected exploration. For information on deleting explorations, see page 563.

You can select multiple explorations by holding down the CTRL *key as you click the mouse.*

Delete. Click this to delete the selected explorations. For information on deleting explorations, see page 563.

Print. Click this to print the selected explorations. For information on printing explorations, see page 564.

Organize. Click this to display the Formula Organizer Wizard from which you can import and export explorations, system tests, custom indicators, and experts. This is normally used if you have purchased add-on products from Equis or a third party. For more information on the Formula Organizer, see page 432.

Explore. Click this to start the exploration process for the selected exploration(s). For more information on exploring, see page 559

Reports. Click this to display the reports for the selected exploration. This button is grayed out unless an exploration with an "R" next to it (signifying "reports available") is selected. For more information on reports, see page 520.

Options. Click this to display The Explorer Options dialog (discussed below) from which you can control data and reporting options.

Explorer Options

The Explorer Options dialog is used to specify options that affect all explorations. To display this dialog, click **Options** in The Explorer dialog.

Note: This dialog controls options that affect all explorations. To control options that affect *single* explorations, see page 559.

Data Loading

This section controls how many records are loaded for the exploration. The more records you load, the longer the exploration will take.

Load ___ Records. Enter the number of periods to use when calculating the exploration results. Entering a value equal to the number of periods loaded in the chart provides increased precision between cumulative type indicators (see below) calculated on your charts and those calculated in your explorations. You should also choose this if your exploration uses any of the Candlestick functions (see page 477) or the `barssince()` function (see page 438).

Some indicators are referred to as "cumulative" type indicators. The results of a cumulative type indicator depend on the amount of

data loaded. For example, the results of a 10-day exponential moving average calculated with 40 days of data loaded will be slightly different than one calculated with 500 days of data loaded. This is because an exponential moving average retains a small portion of all previous data.

Load Minimum Records. Choose this to optimize the calculation of the exploration for speed. Certain "cumulative" type indicators may not exactly match the results displayed on your charts (see above).

Reporting

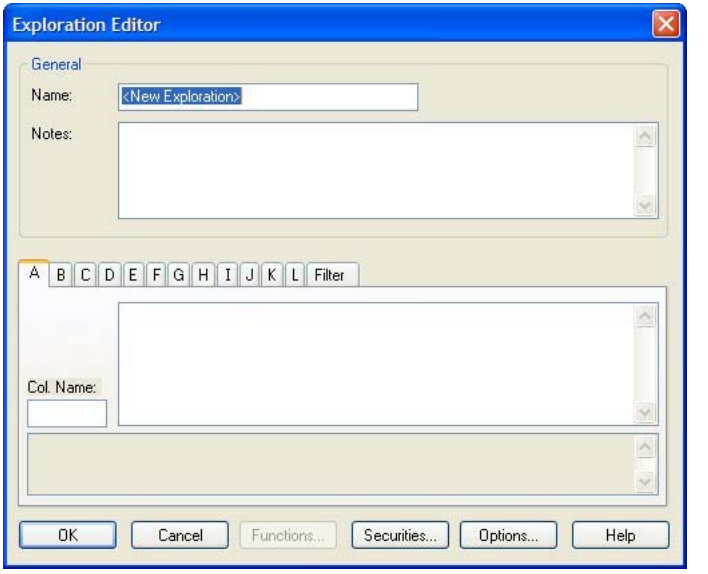
This section allows you to specify whether you want The Explorer to notify you when the exploration is complete.

Notify When Exploration is Done. Check this box to have the "Exploration Completed" dialog appear when an exploration is done.

Creating an Exploration

An exploration performs two separate and distinct tasks. It displays your securities with up to six columns of indicator values. It can also filter your securities. You can create up to 1,000 explorations.
To run The Explorer, choose **Tools>** The Explorer from the menu or click The Explorer button on the standard toolbar.

To create a new exploration, click **New** in The Explorer dialog.
The Exploration Editor dialog appears. This dialog is used to enter the criteria for the exploration. Up to six column formulas and one filter can be included in an exploration.



Name. Enter the name of the exploration in the Name box.

Notes. Enter any descriptive notes in the Notes box.

Columns. Columns A-L specify the values to display in the Results report (see page 570). A separate page is provided for each column. As you click a column's tab, a new page appears where a formula can be typed. Each of the columns represents a unique calculated value. The column formulas are written in MetaStock's formula language (see page 415). Each column formula can be up to 2,500 characters long.

Functions. Click this to open the Paste Functions dialog.
This dialog is used to select from a list of over 190 functions.
The selected function can be inserted directly into your exploration.
For information on this dialog, see page 420.

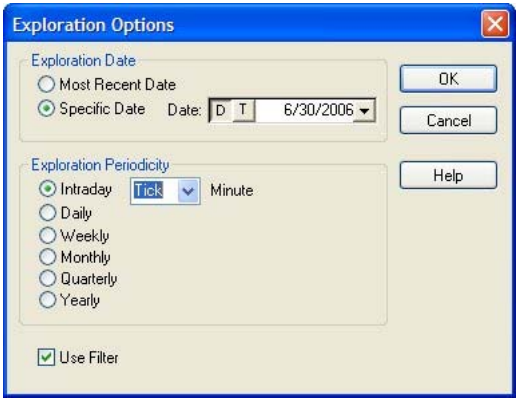
Securities. Click this to open the Select Securities dialog, where you can choose the securities to include in your exploration. For information on this dialog, see page 561.

Options. Click this to open the Exploration Options dialog in which you can set options for the selected exploration. For more detailed information on this dialog, see page 559.

Exploration Options

The Exploration Options dialog is used to specify options that affect only the selected exploration. To display this dialog, click **Options** in the Exploration Editor dialog.

Note: This dialog controls options for a specific exploration. To control options that affect *all* explorations, see page 556.



Most Recent Date. Select this if you want to use the most recent date in each security file for the exploration calculations.

Specific Date. Select this to enter a specific date for which you want the exploration calculated. The most recent date for each security equal to or prior to the date you enter will be used in the exploration.

Periodicity. Select the desired periodicity for the securities in the exploration. Security data will be compressed (if necessary) to match your selection. For example, daily security files can be compressed to weekly or monthly. For more information on periodicity, see page 121.

Note: Selecting a "daily" periodicity will cause weekly, monthly, and yearly security files to be rejected since files cannot be compressed to a shorter periodicity.

Use Filter. Check this box to enable the filter. For information on specifying a filter for your exploration, see page 561.

Column Formula Syntax

Column formulas are written using MetaStock's formula language (see page 415). All custom indicator functions can be used in The Explorer's columns. This includes the `fml()` function (see page 446), which allows you to reference an existing custom indicator with a simple function call. For example, if you wanted to use one of your custom indicators, "Combination Wave" (a complex binary wave) in an exploration column, you could use the fml() function instead of retyping it (e.g.,`fml("Combination Wave")`).

The following shows an example of a column formula that will display the values of the difference between a 10- and 50-day moving average in the Exploration report:

```
mov(CLOSE,10,SIMPLE)- mov(CLOSE,50,SIMPLE)
```

The following shows an example of a column formula that displays a basic 14-day RSI in the Exploration report:

```
rsi(14)
```

The following shows an example of a column formula that will display the difference between formula "ROC1" and formula "ROC2" in the Exploration report:

```
fml("ROC1") - fml("ROC2")
```

Filter Syntax

A filter is written in the identical syntax as the rules in MetaStock's Enhanced System Tester. An additional variable that is unique to the filter criteria is "`COL`". The `COL` variable references the exploration columns directly. This keeps you from having to retype the entire column formula and makes the filter more readable. For example, suppose you've defined column A as follows:

```
mov( rsi( 20 ), 9, SIMPLE)
```

Now you want to display only those securities whose moving average is less than 40. A filter could be written as follows:

```
mov( rsi( 20 ), 9, SIMPLE) < 40
```

However, to save yourself some typing and make the filter more readable, you could use the COL variable as follows:

```
colA < 40
```

Both filters accomplish the same thing, but the second filter requires less typing. This is particularly true when your filter involves long and complex formulas.

Stand-alone Filters

Although a filter can be based on the exploration columns directly, a filter can also be completely independent of the columns. In fact, the exploration columns can be left completely empty. Perhaps you simply want to list the securities that meet your filter criteria without any column values displayed in the report.

For example, your entire exploration could written as follows:

```
cci(9) < -90 and mfi(6) < 50
```

In a report, note that the columns are empty when only a filter is specified. Only the security names are displayed.

Input() Function, Variables, and Multi-plot Indicators

The Explorer will accept assigned variables (see page 425) in the column formula and filter rules. For example, the following is a valid column rule:

```
myvar:=200;
mov(c,myvar,s);
```

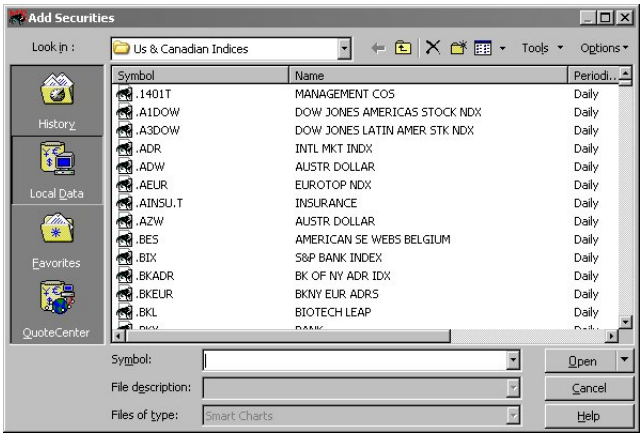
An exploration cannot use the `input()` function directly (see page 451). This function is reserved for custom indicators only. However, if a rule uses the `fml()` function (see page 446) to call the results of a custom indicator, and the custom indicator uses the `input()` function, the `fml()` function will only use the assigned default input value— The Explorer will not prompt for input.

If an exploration contains or references (using the `fml()` function) a multi-plot indicator, only the last plot is used in the calculation of the exploration.

Selecting Securities to Explore

You can explore virtually unlimited local securities (as well as online securities) across multiple folders using the Add Securities dialog. This dialog is accessed by clicking **Securities** in the Exploration Editor, or by clicking **Add Securities** in the Select Securities dialog. If no securities have been specified for an exploration, The Explorer displays the Select Securities dialog automatically, prompting you to make your selections.

The Add Securities dialog is almost identical to the Open dialog.



History. Choose the History shortcut from the Shortcut Bar to show the list of securities you have most recently accessed. You can adjust the size of the history by choosing **Tools>** Limit History Items.

Local Data. Choose the Local Data shortcut from the Shortcut Bar to open an existing Smart Chart located on a local disk drive. The local data folder from which you last viewed a security is displayed.

Favorites. Choose the Favorites shortcut from the Shortcut Bar to choose from your list of predefined favorite securities, and charts. To add an item to Favorites, choose **Tools>** Add to Favorites. For more information about favorites, see page 562.

<Online Data Vendor>. If you are using an online data vendor, you may select from a list of securities available from your vendor by choosing this shortcut from the Shortcut Bar.

Look in. Use this drop-list to select the folder that contains the desired Smart Chart or chart. Scroll through the folders until the desired folder is listed.

Security name / Symbol / File Name. The chart you select from the underlying list appears in this box. This is the chart that will be opened. You can select multiple charts to open by holding down the SHIFT or CTRL key as you make your selections. For information on filtering securities in this dialog, see page 96.

Maintaining Lists of Securities with Favorites

The Favorites feature lets you load and save predefined lists of securities to perform explorations on. To add a list of securities to your Favorites, click **Save...** in the Select Securities dialog. To load a list of securities from your Favorites, click **Favorites** in the Add Securities dialog.

Perhaps you want to divide your securities into specific categories. To do this, you could create a list that includes only computer stocks, another that contains only commodities, another that contains only automobile stocks. Instead of having to select these individually each time for different explorations, you can group them into easily accessible folders. You can also save the list of securities generated by an Exploration as a list (see page 570).

The list "Results of Last Exploration" is automatically generated by MetaStock. This includes only the securities from the last exploration that were not rejected. This list can be used, but it cannot be deleted or modified.

Note: Explorations and system tests can be run on a list that has been created in The DownLoader, but the lists that are saved to the favorites folder after running a system test or exploration can't be used in The DownLoader.

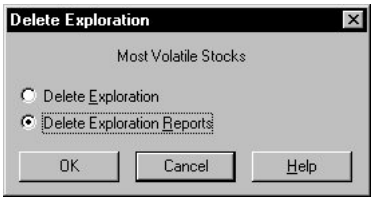
Copying and Deleting Explorations

To make a copy of an exploration selected in The Explorer dialog, click **Copy**. This is useful when you need to design a new exploration that is very similar to an existing one.

For example, if Exploration A was similar to a new exploration you want to create, you could use Copy in The Explorer dialog to make a duplicate rather than rewriting it. You could then make the minor modifications necessary and name it Exploration B.

You can select multiple explorations by holding down the CTRL *or* SHIFT *key as you click the mouse.*

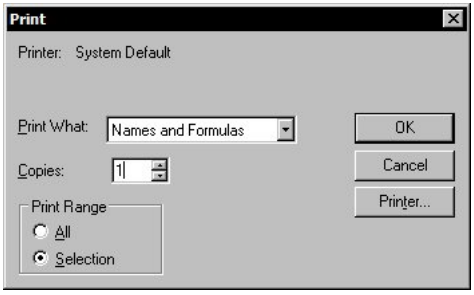
You can delete the selected explorations from The Explorer dialog by clicking **Delete**. This displays the Delete Exploration dialog.



Choose whether you want to delete the explorations or the explorations' reports. If you delete the explorations, the reports are also deleted.

Printing Explorations

You can print the names and/or formulas of your explorations with the Print dialog. To access the Print dialog, click **Print** in the The Explorer dialog.



Print What. Choose Names Only if you want to print only the names of the explorations. Choose Names and Formulas if you want to print the names and formulas.

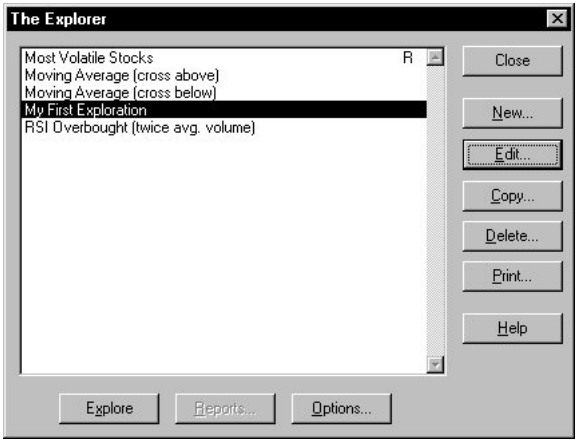
Copies. Enter the number of copies to print.

All. Choose this button if you want to print all explorations.

Selection. Choose this button if you want to print only the selected explorations.

Running the Exploration

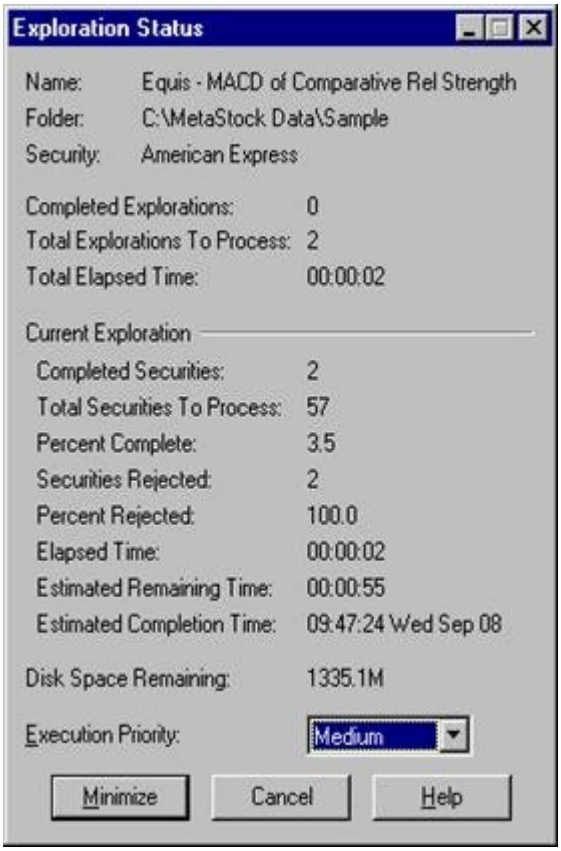
To run an exploration, highlight the exploration name in The Explorer and click **Explore** .



Note: The time required to complete an exploration depends on the complexity of the exploration and if you've chosen to use the minimum or maximum amount of data for the calculations (see page 556). Your computer hardware (i.e., processor, hard disk, etc.) also has a big impact on speed.

Exploration Status Dialog

During the execution of an exploration, the Exploration Status dialog appears. This dialog keeps you informed on the progress of the exploration. You can also use it to run the exploration in the background, allowing you to perform other tasks while the exploration is executing.



Most of the information in this window is self-explanatory. Several of the items are explained below.

Estimated Completion Time. This is based on the average time to explore each security. The estimated completion time is adjusted after each security.

Execution Priority. This drop-list allows you to control the amount of processor time devoted to the computation of the exploration. You will normally leave this set to "Medium." Set this to "Low" if the program seems "jerky" or unresponsive while an exploration is running in the background (i.e., the exploration is minimized).

Minimize. Use this button to minimize the Exploration Status dialog. When an exploration is minimized, you are free to use any other feature in the program. You can even perform a system test, which can also be minimized (see page 515).

When minimized, double-click the exploration icon to redisplay the Exploration Status dialog.

Cancel. You can cancel the exploration process by pressing this button. There may be a slight delay after you click **Cancel**.
A window appears asking you to confirm the Cancel. Reports for the securities that were completed before pressing **Cancel** will be available for your inspection (see page 520).

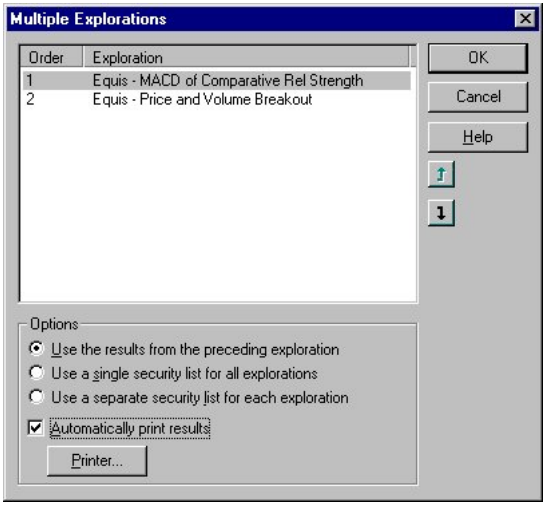
To run an exploration in the background

1. Start an exploration.
2. When the Exploration Status dialog appears, click the Execution Priority drop-list to choose the desired execution priority. If you are planning on using other calculation intensive features in this or other programs while the exploration runs in the background, choose Medium or Low.
3. Click the **Minimize** button.

Running Multiple Explorations

There may be times when you wish to run more than one exploration on the same list of securities, run an exploration on the results of another exploration, or run several explorations on separate lists of securities without having to start each exploration separately. Each of these scenarios is possible using the Multiple Explorations dialog.

To run more than one exploration, hold down the CTRL or SHIFT key while selecting the explorations, then choose the Explore button from The Explorer dialog. The Multiple Explorations dialog will appear allowing you to specify how each exploration is run.



The explorations are listed in numerical order. Use the arrows to the right of the list to change the order of the explorations.

Use the results from the preceding exploration. Choose this option to run each subsequent exploration on the results of the previous exploration. The first exploration uses the list of securities selected in the Select Securities dialog (see page 561).

Use a single security list for all Explorations. Choose this option to run all explorations on the same list of securities.

Use a separate security list for each Exploration. This option allows you to choose a separate list of securities for each exploration.

Automatically print results. Check this box to send the exploration results directly to your printer as each exploration is completed.

Print. Click this button to select a printer.

Speed of Calculation

The speed of the exploration can be increased by:

- Decreasing the number of periods used in the formulas.
- Selecting "Load Minimum Records" in The Explorer Options dialog (see page 556).
- Reducing the number of references to formulas (for example, the `fml()` function).
- Adding a faster or more powerful CPU.
- Adding a faster disk drive.
- Moving the data to a separate physical drive from the Windows Operating System.
- Using local data instead of data stored in the online cache folder (see page 52).

Viewing the Reports

Exploration reports can be accessed two ways. You can choose the **Reports** button from the Exploration Completed dialog. This dialog appears immediately after an exploration has completed (the Notify When Exploration is Done box must be checked in Explorer Options, see page 556). You can also view a report by selecting an exploration in The Explorer dialog and choosing Reports. An "R" must be displayed next to the selected exploration.

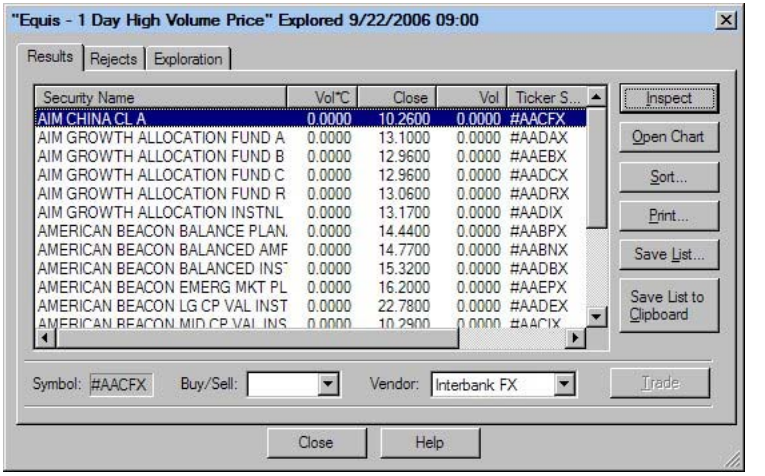
There are three reports available for an exploration; each is available by choosing the corresponding tab from the Reports dialog.

- The Results report displays every security (that was not rejected) in the exploration and its accompanying column values. The folder from which each security came is displayed in the last column.
- The Rejects report shows every security that was rejected and the reason (see page 573).
- The Exploration Security Column Data report shows the historical column values for the selected security (see page 573).

Results Report

The Results report displays the results of the exploration. Every security that passed the filter (if enabled), along with all of the defined columns will appear. The name assigned to the exploration along with the calculation date is displayed at the top of the report.

The width of a column in the Results report can be adjusted by dragging the vertical separator between the column headings with the mouse until the column is the desired width.



Inspect. This displays the Exploration Security Column Data report (see page 573) for the selected security. This report displays historical values required to calculate each column for the highlighted security.

Open Chart. Click this button to display a chart of the selected security.

Sort. Use this to sort the report on any of the columns. Note that you can also click directly on the column headings to sort.
Click repeatedly to change between ascending and descending order.
For more information on sorting, see page 572.

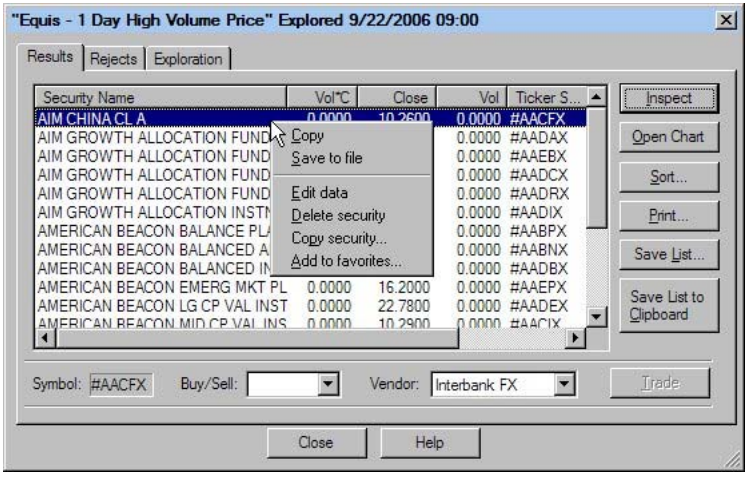
Print. Choose this to print the contents of the Results report.
For information on printing reports, see page 530.

Save List. Choose this option to save the results as a list that you can use in The Explorer and The DownLoader.

Save List. Choose this option to save the results to the Windows clipboard so you can paste it into other Windows applications.

Using the Shortcut Menu

You can also add to favorites, copy, delete, or edit the securities in the results report. First, select the desired securities, then right-click on one of the highlighted securities. A menu appears for you to choose from.



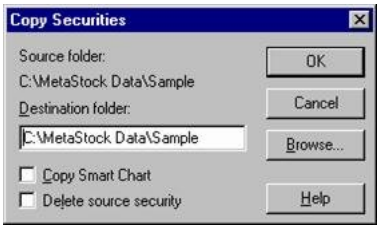
Copy. Choose this to copy the entire report onto the Windows clipboard so it can be pasted into another Windows document.

Save to file. Choose this to save the list as a text file.

Edit data. Choose this to open the selected security(s) in a datasheet in The Downloader where the data may be edited.

Delete security. Choose this to delete the selected security(s).

Copy security. Choose this to copy the selected security(s) to another folder on a local drive. The Copy Securities dialog will appear. Enter the new folder in the Destination folder box, or click the **Browse** button to find the folder you want to copy to. If you want the Smart Chart for that security to be copied also, check the Copy Smart Chart box. If you want to delete the security from the current folder, check the Delete source security box.

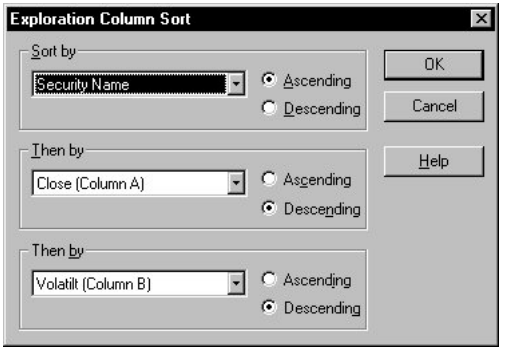


Add to favorites. Choose this to add the selected security(s) to your favorites. For more information about favorites, see page 562.

To Sort the Results Report

You can sort the Results report on any of the columns (including the Security name column) in either ascending or descending order. Simply click the column heading on which you want to sort. Click repeatedly to toggle between ascending and descending order. When you sort on the security name column, the report is sorted alphabetically.

To control the primary, secondary, and tertiary sort columns, use the Exploration Column Sort dialog. This dialog is accessed by clicking the **Sort** button in the Results report.



Sort by. Choose the primary column on which the report is sorted from the drop-list.

Then by. Choose the column on which duplicates from the previous "sort" should be sorted. For example, if the security named "IBM" appeared five times in the report, these five occurrences of IBM would then be sorted by the column you choose here.

The sort order of the report is affected the most by the sort column specified in the Sort by box. The sort columns specified in the Then by boxes only take effect when there are duplicates.

Ascending. Choose this to change the sort order of the column to ascending (i.e., the values increase as you go down the report).

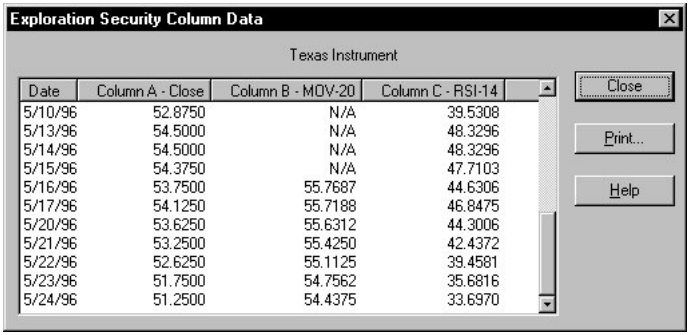
Descending. Choose this to change the sort order of the column to descending (i.e., the values decrease as you go down the report).

Exploration Security Column Data Report

This report is accessed by selecting a security in the Results report and choosing Inspect. This report lets you view the column values for every time period used in the calculation of the exploration.

The amount of data displayed in this report is determined by the Data Loading option setting in The Explorer Options dialog (see page 556).

The width of a column in this report can be adjusted by dragging the vertical separator between the column headings with the mouse until the column is the desired width.



Date	Column A - Close	Column B - MOV-20	Column C - RSI-14
5/10/96	52.8750	N/A	39.5308
5/13/96	54.5000	N/A	48.3296
5/14/96	54.5000	N/A	48.3296
5/15/96	54.3750	N/A	47.7103
5/16/96	53.7500	55.7687	44.6306
5/17/96	54.1250	55.7188	46.8475
5/20/96	53.6250	55.6312	44.3006
5/21/96	53.2500	55.4250	42.4372
5/22/96	52.6250	55.1125	39.4581
5/23/96	51.7500	54.7562	35.6816
5/24/96	51.2500	54.4375	33.6970

Print. Choose this to print the contents of the report. For information on printing reports, see page 530.

Rejects Report

This report displays the securities that were not included in the Results report. Each security that was rejected from the report will be listed, with a brief description of why it was rejected.

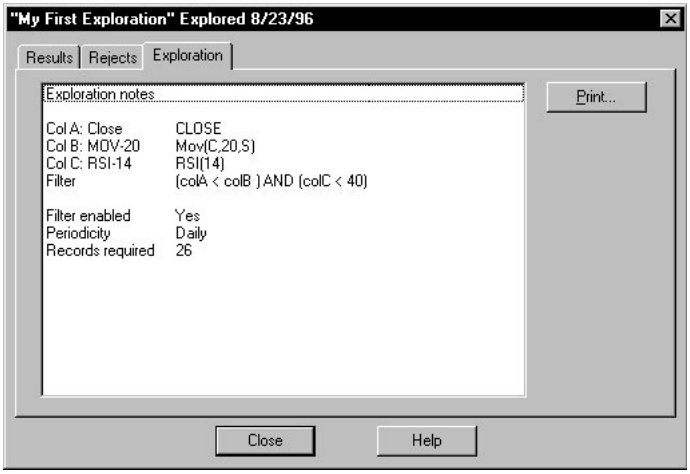
If your exploration contains a filter, this report will list all securities that were filtered out. Securities that were rejected due to an error are also listed. For example, if your exploration calculates a 200-period moving average and your IBM data file only contains 100 days of data, IBM would appear in the Reject report.

Print. Choose this to print the contents of the Rejects report. For information on printing reports, see page 530.

Save List. Choose this option to save the results as a list that you can use in The Explorer and The DownLoader.

Exploration Page

The Exploration page displays the column formulas, the filter rule, periodicity and other information used for the exploration.
Having this information available with the reports lets you view this information without having to close the reports.



Copying Reports to the Windows Clipboard

You can copy the contents of an exploration report to the Windows clipboard for use in other Windows applications.

Note: Choosing Copy Reports copies the entire report to the Windows clipboard, choosing Save to Clipboard copies the list of symbols only.

To copy a report to the clipboard

1. Display a report.
2. Right-click anywhere within the report's page.
3. Choose Copy to copy the contents of the report to the clipboard. You can then paste the contents into another Windows application.

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Sample Explorations

This section shows the column and filter formulas for six example explorations. Several predefined explorations are also included with MetaStock.

Long-term Bearish

This exploration shows securities that are below their 200-day moving average.

Column A:
```
close
```

Column B:
```
mov(close,200,exponential)
```

Column C:
```
((close-mov(close, 200,
    exponential)) /
    Abs(Mov(close,200,exponential)
    )) * 100
```

Filter:
```
colA < colB
```

This exploration requires only a filter to produce the desired list of securities. However, the exploration also includes columns for the closing price, the 200-day moving average value, and the percent the close is below its 200-day moving average.

Long-term Bullish

This exploration shows securities that are above their 200-day moving average.

Column A:
```
close
```

Column B:
```
mov(close,200,exponential)
```

Column C:
```
((close-mov(close, 200,
    exponential)) /
    Abs(Mov(close,200,exponential)
    )) * 100
```

Filter:
```
colA > colB
```

This exploration requires only a filter to produce the desired list of securities. However, the exploration includes columns for the closing price, the 200-day moving average value, and the percent the close is above its 200-day moving average.

Note: The only difference between this exploration and the Long-term Bearish exploration is the “greater than” sign (i.e., “>”) in the filter.

MACD Buy Signal

This exploration shows securities that have produced a classic MACD "buy" signal (i.e., when the MACD rises above its signal line).

Column A: `close`
Column B: `macd()`
Column C: `mov(macd(),9,exponential)`
Filter:
```
cross(macd(),mov(macd(),9,
    exponential)
```

This exploration only requires a filter to produce the desired list of securities. However, the exploration also includes columns for the closing price, the MACD value, and the 9-day signal line value.

Indicators, 5 popular

This exploration shows the column formulas that will show each security's close along with five popular indicators.

Column A: `close`
Column B: `macd()`
Column C: `Stoch(5,3)`
Column D: `cci(14)`
Column E: `obv()`
Column F: `rsi(14)`
Columns G through L: `EMPTY`

This exploration does not require a filter. This exploration could be easily modified to include your favorite indicators.

Performance, Daily

This exploration shows the short-term performance of each security. average.

Column A: `close`
Column B: `roc(close,1, percent)`
Column C: `roc(close,5, percent)`
Column D: `roc(close,10, percent)`
Column E: `roc(close,30, percent)`
Column F: `roc(close,60, percent)`
Columns G through L: `EMPTY`

This exploration does not require a filter since we want to see every security's performance ranking. The Exploration Report has been

written to include columns for five performance criteria including a one-day, five-day, 10-day, 30-day, and 60-day percentage rate-of-change.

You may want to use the **Sort** button in the Results report to sort on one of the performance columns. For example, you could sort the report so that securities with the highest 60-day performance appear at the top of the column.

Price and Volume Breakout

The following exploration produces a report listing all securities that have risen more that 5% in the last day on at least 50% greater than average volume.

Column A: `close`

Column B: `ref(close,-1)`

Column C: `roc(close,1,percent)`

Column D: `volume`

Column E: `mov(volume,50,exponential)`

Column F:
```
((volume -
    mov(volume,50,exponential)) /
    mov(volume, 50, exponential)) *
    100
```

Columns G through L: `EMPTY`

Filter:
```
(colC >= 5) and (colD >= (colE*1.5))
```

This exploration requires only a filter to produce the desired list of securities. However, the exploration also includes columns for the closing price, the previous day's closing price, the percent rate-of-change, volume, average volume, and the percent the volume is above its average.

Exploration Tips

- Due to the way the Performance indicator is calculated, you may notice that the column values displayed on the Results report for the Performance indicator are not consistent. We recommend that you avoid using the `Per()` function in explorations.
- The Explorer will not include composite securities in an exploration. If an exploration folder contains composites, they will be ignored.
- Exploring data stored in the online cache folder is very slow. If you plan to run explorations regularly, you should consider using local data instead.
- Remember to use the `COL` variable within your filter to directly reference the columns. Using the `COL` variable is especially beneficial when the column formulas are long.
- For your explorations to be valid, it is important that your data be accurate and date-aligned. Date-aligned means that the dates for each of the securities included in the exploration match. If data is missing for a security (even a single day), the values shown in the reports may not be accurate.
- You may want to include a broad-based market index in your exploration to see how it compares to your other securities. Including an index is especially helpful when you are using The Explorer to rank your securities by performance. Several predefined performance explorations are included with MetaStock.
- You can reference an indicator in a chart by selecting the indicator (i.e., clicking on it so handles appear) and then substituting the "P" variable (see page 429) in place of a formula's data array. For example, the formula `mov(p,10,s)` would calculate a 10-period moving average of the selected indicator.
- You should avoid using the "`ref()`" function to reference column formulas (e.g., `ref(colA, -1)`). The Explorer only calculates values for the "calculation date." The `ref()` function returns the value for this date only.
- You should avoid using the "`cross()`" function to reference column formulas (e.g., `cross(colB, colC)`). The `cross()` function requires data for two days in order to determine if the "cross" actually occurred. The Explorer only calculates the column values for the specified "calculation date."
- When doing an exploration with the Exploration Periodicity set to "weekly," you may receive a "period value out of range" error message due to there not being enough data. As an example, there may be enough data to calculate a 200-*day* moving average, but not enough for a 200-*week* moving average.

Getting Expert Advice on Your Securities

What is the Expert Advisor?

The Expert Advisor is a collection of powerful tools that keep you informed of the current technical state of a chart. When attached to a chart, an Expert can inform you on the state of these conditions by various methods:

- Descriptive text (called Commentaries)
- Colored bars (called Highlights)
- A symbol in the bottom corner of the chart (the “Expert Corner”)
- A special inner window (called a Ribbon)
- Symbols on the chart (called Symbols)
- Pop-up messages, sound or video (with Alerts)
- Email and pager messages (with Alerts)

Most people will simply use experts that are prepackaged with MetaStock, or purchased from Equis or a third party. For example, if you want to see Bill William’s expert commentary on any chart you display, simply right-click on the chart, choose Expert Advisor, Attach, then choose Bill William’s prepackaged expert.

IMPORTANT: Due to the inherent complexity in the design and creation of custom indicators, trading systems, explorations, and experts, Equis cannot provide support over the phone for this process. However, support is available through email. The `Formula Help.doc` file, found in the MetaStock folder, is a sample request form you can use when requesting this service. Complete the form in detail and email it to *formulas@equis.com* or submit a request via the Equis web site under Customer Zone | Trading Resources | Custom Formulas. This service is usually free, but we reserve the right to charge a fee for extensive development.

If you are willing to invest a little time, you can create your own experts. For example, you could create your own customized commentary. You could create alerts that will sound and display a message when certain conditions are met. Perhaps you would like to have your price bars colored red when the RSI is above 50 and black when they’re below 50. The possibilities are endless.

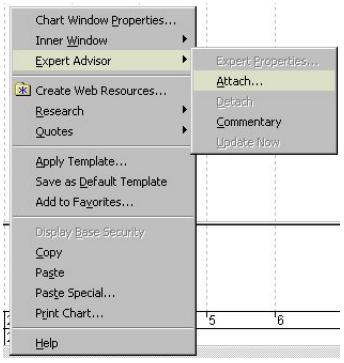
If you want to create your own experts, you must be familiar with the MetaStock formula language. For more information on the MetaStock formula language, see page 415.

IMPORTANT: Equis International is *not* a Registered Investment Advisory service. The experts included with MetaStock are for educational purposes and are to be *used at your own risk*. Equis International (or its partners) is not liable for the investment decisions you make based on information obtained from the Expert Advisor.

Using Prepackaged Experts

Most people will never create their own experts. That's fine! We designed the Expert Advisor as a tool to provide information on the technical status of a security. Not only is MetaStock shipped with many prepackaged experts that you should find useful, other prepackaged offerings will be available directly from Equis and third parties. Therefore, if you just want to use the experts that are prepackaged with MetaStock (or purchased separately), this section is all you really need to read.

1. Display a chart to which you would like to attach an expert.
2. Right-click anywhere within the chart's inner window. The chart's shortcut menu appears.



3. Choose Expert Advisor and then Attach.
4. For this example, choose Equis – Stochastic Oscillator from the Attach Expert dialog. Click the **OK** button.

5. The appearance of your chart will now change to reflect the newly attached expert. The illustration below shows some of the components that you may see.

6. To quickly display the commentary for the attached Expert, right-click on the chart, choose Expert Advisor and then Commentary.

That's it. This simple procedure is all that is required to reap the power of the Expert Advisor.

IMPORTANT: Equis International is *not* a Registered Investment Advisory service. The experts included with MetaStock are for educational purposes and are to be *used at your own risk.* Equis International (or its partners) is not liable for the investment decisions you make based on information obtained from the Expert Advisor.

Expert Advisor Dialog

Expert Advisor button

The Expert Advisor dialog is displayed by choosing Expert Advisor from the Tools menu or clicking the Expert Advisor button on the standard toolbar. The Expert Advisor dialog lists the names of all your experts (both those you have created and those prepackaged with the software). The Expert Advisor dialog can hold up to 1,000 experts. The selected expert can be edited, copied, deleted, printed, and attached. You can also create new experts from this dialog. A small triangle appears next to the expert that is currently attached to the selected chart.

New. Use this to display the Expert Editor dialog in which you can specify the components of a new expert. For information on creating new experts, see page 585.

Edit. Use this to display the Expert Editor dialog in which you can edit the selected expert.

Copy. Use this to make a copy of the selected expert. For information on copying experts, see page 627.

You can select multiple experts by holding down the CTRL *key as you click the mouse.*

Delete. Use this to delete the selected expert. For information on deleting experts, see page 627.

Print. Use this to print the selected expert. For information on printing experts, see page 628.

Organize. Use this to display the Formula Organizer Wizard from which you can import and export explorations, system tests, custom indicators, and experts. This is normally used if you have purchased add-on products from Equis or a third party. For more information on the Formula Organizer Wizard, see page 432.

Attach/Detach. Use this to attach the selected expert to the current chart. This button changes to **Detach** if the selected expert is already attached to your chart. A small triangle appears next to the attached expert. The **Attach** button is disabled if no chart is displayed. For information on attaching experts, see page 626.

Commentary. Use this to view the corresponding commentary (if available) for the selected expert. The **Commentary** button is disabled if no chart is displayed. For information on commentaries, see page 601.

Caution: Changes made to an expert attached to a chart will affect all charts to which the expert is attached. A warning message will appear informing you about the effects of editing an expert.

Creating an Expert

Perhaps the most important thing to remember when creating an expert is that it can be as simple or complex as you like.
For example, you can create a very simple expert that simply sounds an alert (page 622) whenever the close crosses above its moving average. Another expert could be written to display a ribbon (page 592) at the bottom of the chart showing the bullish and bearish zones as defined by an RSI. Or you could write an expert that generates a commentary explaining the current state of the security as defined by five of your favorite indicators (page 594).
The possibilities are many.

To run the Expert Advisor

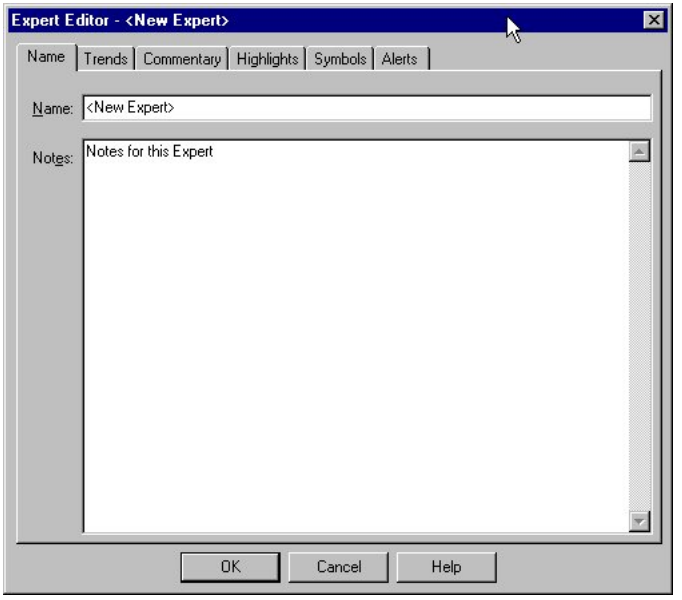
Expert Advisor button

To run the Expert Advisor, choose Expert Advisor from the Tools menu or click the Expert Advisor button on the standard toolbar.

To create a new expert

1. Choose Expert Advisor from the Tools menu or click the Expert Advisor button on the standard toolbar.
2. Click **New** in the Expert Advisor dialog.
   The Expert Editor dialog appears. You use this dialog to create the various components of an expert. **Again, it is important to remember that an expert need not contain every component. In fact most experts you create will probably only contain one or two components.** The only components required are the Name and *one* of the other five components: Trend, Symbols, Commentary, Highlights, or Alerts.

This dialog is different from most in that you can resize it. Position the mouse over the border of the dialog and click and drag the mouse until the dialog is the desired size. This is very convenient when writing commentaries.



Name. Enter the name of the expert in the Name box. Type any unique information about the expert in the Notes box.

You may want to use a consistent naming convention that describes the components used in the expert. For example, if the only component of the expert is a commentary, you may want to name it "MyExpert (commentary)". If the only component was an alert, you may name it "MyExpert (alert). The more descriptive the name, the easier it will be for you to remember what the expert does.

Trend. Enter the Bullish and Bearish trend rules. The rules are written using MetaStock's formula language (page 415). The rules are interpreted as either true or false. The results of the trend rules are displayed in a ribbon, the expert corner (page 593), or in the Data Window. For more information on writing and viewing trend rules, see page 594.

Commentary. Enter the commentary to display. Commentaries are used to tell you, in English (or German, Spanish, etc.), the technical state of the security. There are two special functions and five constants available specifically for writing commentaries. The built-in editor also has a basic word-processing like toolbar that allows you to control fonts and formatting. The results of the commentary are displayed in the Expert Commentary dialog. For more information on writing and viewing commentaries, see page 594.

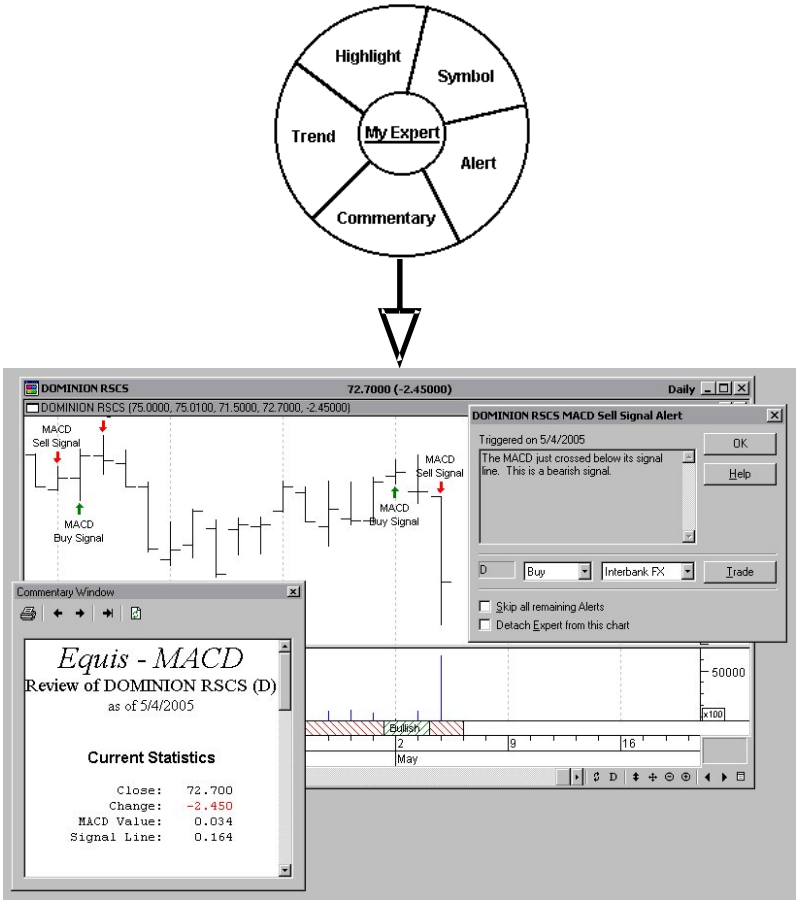
Highlights. The Highlight page is used to create and edit highlights. A highlight colors a chart's price bars to indicate specific conditions. An unlimited number of highlights can be defined for an expert. For more information on creating highlights, see page 611.

Symbols. The Symbol page is used to create and edit symbols. A symbol can be placed above or below price bars to indicate specific conditions. An unlimited number of symbols can be defined for an expert. For more information on creating symbols, see page 616.

Alerts. The Alert page is used to create and edit alerts. When the defined conditions of the alert are met, a specified message will appear, an audible sound file or video will play, or an email or pager notification will be sent. An unlimited number of alerts can be defined for an expert. For more information on using alerts, see page 622.

Components of an Expert

An expert can be as simple or complex as you want. The following illustration shows an expert that contains all five components. In order for an expert to produce results, it must be attached to a chart as illustrated by the arrow.

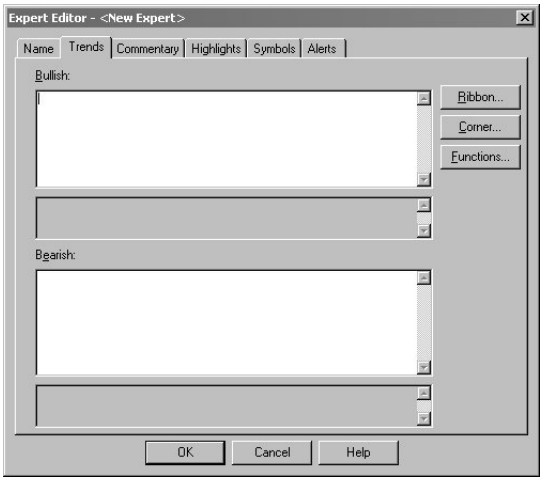


In most cases, an expert will only contain one or two components. In fact an expert containing just one of the components will likely be the most common.

The illustration below shows an expert containing just two components being attached to a chart.

Defining Bullish and Bearish Trends

Bullish and bearish trends are defined in the Trends page in the Expert Editor dialog. The rules for the bullish and bearish conditions are written using MetaStock's formula language (page 415). Each rule can contain up to 2,500 characters.



There are three states that a trend normally falls within:

Bullish. The trend is considered bullish if and only if the bullish trend rule is true.

Bearish. The trend is considered bearish if and only if the bearish trend rule is true.

Neutral. The trend is considered neutral if neither the bullish nor bearish trend rules are true.

A trend can also be in one of the following states:

Confused. The trend is considered confused if both the bullish and bearish trend rules are true simultaneously. This usually indicates an error in the logic of the trend rules. You should double-check your formulas to make sure they define the conditions properly.

Undefined. The trend is considered undefined if the formula is not up to speed (e.g., during the first 49 periods of a 50-period moving average). The first few days displayed in the ribbon are usually undefined since most indicators take a while to get up to speed.

The results of a trend are displayed in an expert ribbon, the expert corner or in the Data Window.The following chart shows both an expert ribbon and the expert corner.

The expert ribbon is a small, narrow window located in the chart. The color, patterns, and labels for the bullish, bearish, and neutral zones can be defined within the Expert Ribbon dialog (page 592). The ribbon can be moved within the chart using the same drag and drop techniques as with inner windows (page 130).

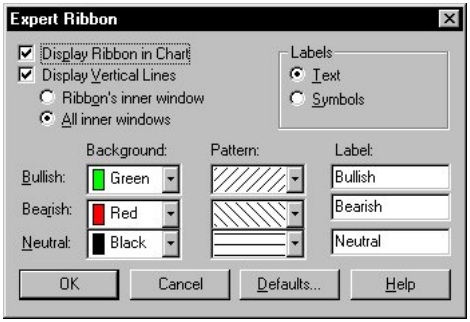
The expert corner is located in the bottom corner of the chart where the x- and y-axes meet. This is where a user-specified symbol is displayed. This symbol denotes the current condition of the security as defined by the trend rules (i.e., bullish, bearish, or neutral).
For more information on the expert corner, see page 593.

Displaying the Trend in a Ribbon

The ribbon is displayed at the bottom of the chart. It shows the bullish, bearish, and neutral zones in the chart.

The expert ribbon provides a convenient way to view the historical bullish, bearish, and neutral zones of a security. The rules that define these zones on a ribbon are created in the Trends page of the Expert Editor dialog (page 585).

You can control the color, patterns and labels used in the expert ribbon from the Expert Ribbon dialog. This dialog is displayed by choosing the **Ribbon** button on the Trend page of the Expert Editor dialog.



Display Ribbon in Chart. Check this box if you want the ribbon displayed in the chart.

Display Vertical Lines. Check this box if you want vertical lines displayed when the trend changes. Choose the Ribbon's Inner Window radio button if you only want the lines displayed in the inner window in which the ribbon is located. Choose All Inner Windows if you want the lines to extend through every inner window in the chart.

Background. Choose the background color to use for bullish, bearish, and neutral zones of the ribbon.

Pattern. Choose the pattern to use for bullish, bearish, and neutral zones of the ribbon.

Label. Type a label or choose a symbol (depending on whether you chose the Text or Symbols radio button) to use for the bullish, bearish, and neutral zones in the ribbon.

Note: Text labels will not display if the zone is not wide enough to hold the entire label. Therefore you may want to limit the number of characters used in your text labels. If your zones are very narrow, you may want to use symbols rather than text-based labels, as they occupy less space.

Text. Choose this radio button if you want the labels displayed using the specified text.

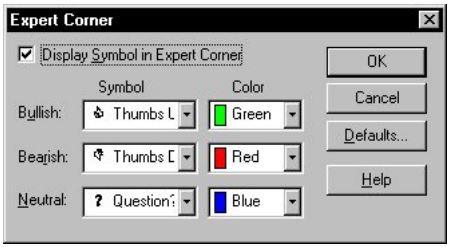
Symbols. Choose this button if you want the labels displayed using the specified symbols.

Displaying the Trend in the Expert Corner

The expert corner is displayed beneath the right y-axis if both axes are displayed.

The expert corner is a small area located in the bottom corner of the chart where the x- and y-axes meet. This area is reserved for the display of a symbol. The symbol indicates the current trend (i.e., for the last bar loaded in the chart) of the security. The rules that define expert corner symbol are created in the Trend page of the Expert Editor dialog (page 585). A user defined symbol will appear if the current state is bullish, bearish, or neutral. If the state is confused (page 590), the symbol for neutral will appear. If the state is undefined, no symbol will appear.

The color and style of the symbol is controlled from the Expert Corner dialog. This dialog is displayed by choosing the **Corner** button on the Trend page of the Expert Editor dialog.



Display Symbol in Expert Corner. Check this box if you want symbols displayed in the Expert Corner area of the chart.

Symbol. Choose the symbol to use for the bullish, bearish, and neutral state of the security.

Color. Choose the color to use for the symbol. Be sure to choose a color that is different from the background color of the expert. Otherwise, the symbol will not be visible.

Tips for Using Trends

- If you find the vertical lines obstructive to your charts, but you'd still like to pinpoint the beginning and ends of trends, use highlights (page 611). Create two highlights, one that matches the bullish trend, and another that matches the bearish trend. The color of the price bars will coincide with the ribbon.
- If most of the labels on your ribbons aren't showing up due to the narrowness of the zones, change the label to display a symbol rather than text. Symbols generally take up much less space. This is done from the Expert Ribbon dialog (page 592).
- The 200-day moving average is considered sacred to many technical analysts. It is a good indicator of the long-term trend of the security. You may want to create an expert corner that shows a bullish symbol when the price is above its 200-day moving average and a bearish sign when it's below.

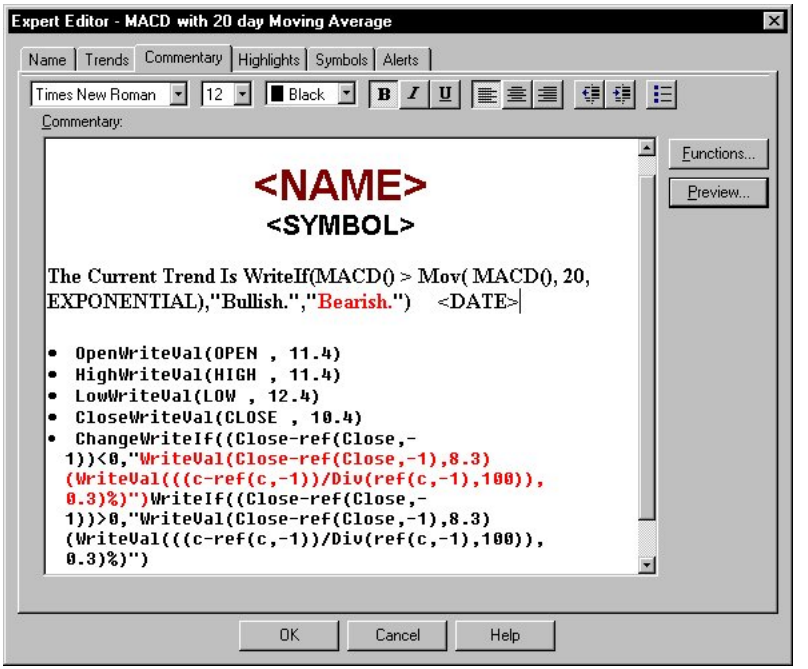
Writing Commentaries to Summarize and Instruct

A commentary is perhaps the most versatile and powerful component of the Expert Advisor. Although many people will use prepackaged expert commentaries, you may want to create your own.

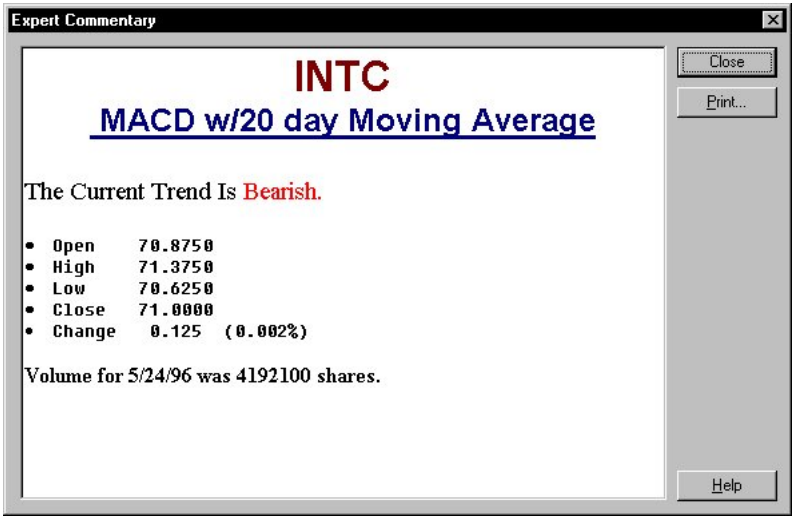
Briefly stated, a commentary allows you to write text and then control what text is displayed based on logical conditions. In other words, some text can be displayed at all times and the display of other text can be dependent on whether a specified condition is true or false. The writeif() and writeval() functions are the key functions used when writing commentaries. These two functions are unique to the commentary syntax.

As is the case with the other components in the Expert Advisor, commentaries can take full advantage of MetaStock's powerful formula language (page 415). Therefore, you should be familiar with custom indicators to take full advantage of commentaries.

The following illustration shows a commentary in its native format:



The following illustration shows the same commentary as it would be viewed:



A great way to learn the power and flexibility of commentaries is by viewing the prepackaged expert named "Equis - Instructional Commentary" written by Steve Achelis, founder of Equis International.

To view Steve Achelis' prepackaged instructional commentary

1. Display a chart.
2. Choose Expert Advisor from the Tools menu.
3. Choose the expert named "Equis - Instructional Commentary" from the dialog and click the **Edit** button.
4. Click the Commentary tab.

Displaying Conditional Text with Writeif()

The `writeif()` function displays the specified text if the condition is true. Optionally, you can have the function display the specified text if the condition is false. If the condition is true, the first text

string is displayed. If the condition is false, the second text string is displayed.

The following is the syntax of the writeif() function.

```
writeif(logical formula, “true text string”,
“false text string”)
```

Each text string must be contained within double quotes (“ "). If you need the text itself to contain quotes, they can be written as \” as shown below.

```
writeif(c>mov(c,200,s),"The trend is up and
remember \"the trend is your friend.\"", "The
trend is down.")
```

The length of a text string is virtually unlimited (64K or about 20 pages). This means that your text can wrap across multiple lines if needed. It can even contain line feeds.

The following example writes “The market is bullish” if the closing price is above its 200-day moving average. It writes “The market is bearish” if the closing price is equal to or below its 200-day moving average.

```
writeif(c > mov(c,200,s),”The market is
bullish”,”The market is bearish”)
```

The writeif() function can display numerical values using the writeval() function (page 476). For example, the following example displays the value of the RSI if the close crosses above a 50-day moving average.

```
writeif(cross(c,mov(c,50,s)),”writeval(rsi(14)
)”)
```

Note that in the above example, there was no text specified for a false condition. You don’t have to specify the text for when the condition is false.

Just like the standard if() function in the MetaStock formula language (page 415), you can also nest writeif() statements as shown in the following example.

```
writeif(v>ref(v,-1),”writeif(c>mov(c,10,s),
”bullish”,”bearish”)”,”volume down”)
```

Note: The second writeif() function is completely contained within quotes because it is the true text string for the first writeif() function.

In English, the previous statement says, “If the volume is greater than the previous day’s volume (i.e., `v>ref(v,-1)`), then check the close to see if it is above its 10-day moving average (i.e.,`c>mov(c,10,s)`). If both of these are true, the word “bullish” is displayed. If volume is greater than the previous day’s, but the close isn’t greater than the 10-day moving average, “bearish” is

displayed. Otherwise, if the volume is not greater than the previous day's volume, "volume down" is displayed."

Clarifying with Comments

You may want to strategically place comments within your commentaries to clarify and explain what is happening. Comments can be very helpful when you need to debug or modify the syntax at a later time.

Comments can be inserted into conditional statements by surrounding the statement in braces. The text inside the braces will *not* appear when the commentary is viewed. In the formula below, "{This is bullish output}" and "{This is neutral/bearish output}" are the comments inside the conditional statement.

```
writeif(cross(c,mov(c,50,s)),
{This is bullish output}"RSI is
writeval(rsi(14))",
{This is neutral/bearish output}"RSI
neutral/bearish")
```

If a comment is entered on its own line, you will probably want to place a backslash (page 601) after the comment so that an extra line feed does not show up in your commentary.

```
{The following defines a support line}\
support:=(If(Abs((Trough(1,L,1)-Trough(2,L,1))
/Trough(2,L,1))<.015 AND
Abs((Trough(2,L,1)-Trough(3,L,1))/Trough(3,L,1
))<.015,{then}
(Trough(1,L,1)+Trough(2,L,1)+Trough(3,L,1))/3,
0));
```

Using Variables in Commentaries

Variables can be used within commentaries. However, they must be assigned within a writeif() or writeval() function. For more information on using variables in commentaries, see page 428.

Displaying Numeric Values with Writeval()

The writeval() function is used to display the value of a formula. The formula contained in the writeval() function must be written using MetaStock's formula language (page 415). The following shows the syntax of the writeval() function.

```
writeval( DATA ARRAY )
```

The following example displays the value of the stochastic oscillator.

```
writeval(stoch(14,3))
```

The writeval() function can be nested within a writeif() function as shown in the following example.

```
writeif(rsi(14) > 80, “writeval(rsi(14))”,”not
above 80”)
```

You can also use the standard if() function to control what value the writeval() function displays. The following formula displays the value of the 10-period moving average if the RSI is greater than 80, otherwise the value of the 20-period moving average is displayed.

```
writeval(if(rsi(14)>80,mov(c,10,s),mov(c,20,s)))
```

Of course the same results would be generated by the following formula using the writeif() function. However, the previous example is more concise.

```
writeif(rsi(14)>80,”writeval(mov(c,10,s))”,”wr
iteval
(mov(c,20,s))”)
```

The above method is required however, if your true/false text needs to combine formula values and text as shown below.

```
writeif(rsi(14)>80,”The 10-period moving
average is writeval(mov(c,10,s)).”,”The
20-period moving average is
writeval(mov(c,20,s)).”)
```

Controlling the Width and Decimal Placement

There may be times when you would like to control the width and decimal placement of numbers generated by the writeval() function. The most obvious use is when aligning values in columns.

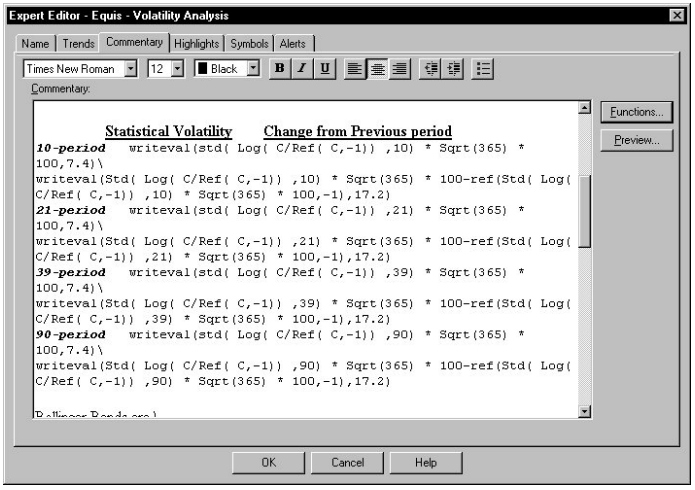
An additional parameter can be attached to the end of the writeval() function to control width and decimal positions. The value to the left of the period controls the width and the value to the right of the period controls the number of places to display to the right of the decimal. Here are some examples.

- 10 characters wide and 3 decimal places:
  ```
  writeval(macd(),10.3)
  ```
- 5 characters wide and 2 decimal places:
  ```
  writeval (rsi(14),5.2)
  ```
- Left-justified with 3 decimal places:
  ```
  writeval(rsi(21),0.3)
  ```
- 8 characters wide with no decimal places:
  ```
  writeval(rsi(34),8.0)
  ```

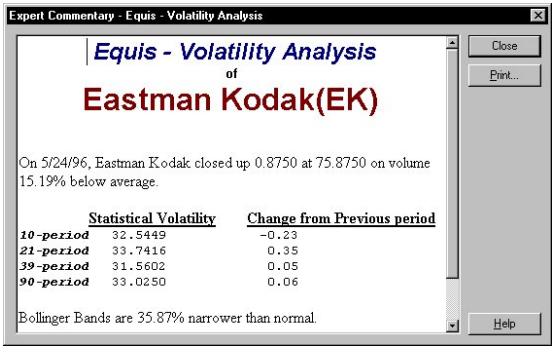
If the width specified is too small to display all of the digits required, the actual number of digits displayed will be the minimum number required to hold the entire value.

If the decimals field is too small to display the total number of decimal digits in the value, the number of decimal digits displayed is truncated (not rounded) to the number requested.

The following illustration shows the commentary to generate a table of indicator values.



The following shows the resulting commentary.



Using Constants in Commentaries

There are five constants that are used to display information about the security the commentary is attached to.

<NAME>. This displays the name of the security.

<SYMBOL>. This displays the ticker symbol of the security.

<PERIODICITY>. This displays the periodicity of the security in the default long format (i.e., daily, weekly, etc.).

Notes:

- To display the periodicity in the short format (i.e., day, week, etc.) append a ":S" (e.g., <PERIODICITY:S>).
- Appending a ":L" or nothing at all, displays the default long format.
- The initial capitalization of <PERIODICITY> controls whether or not the first letter of the periodicity is capitalized. <Periodicity> capitalizes the first letter (i.e., Daily); whereas <periodicity> keeps the first letter in lower-case (i.e., weekly).

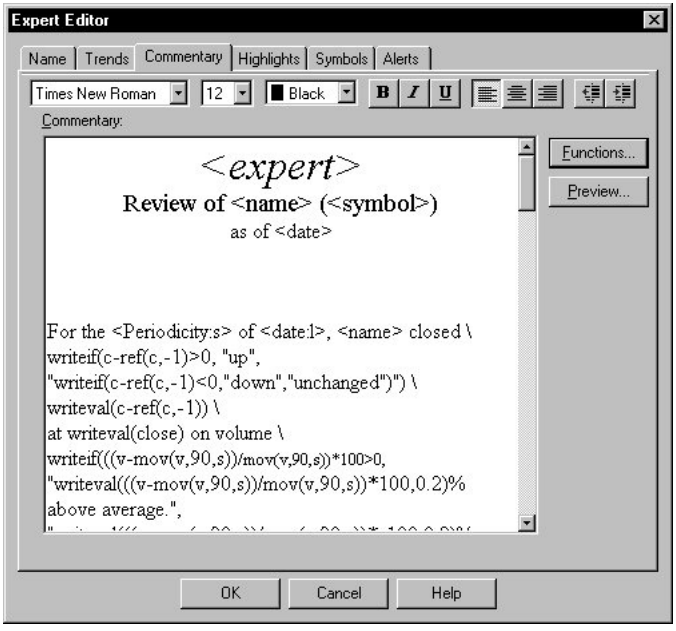
<DATE>. This displays the date (and time for intraday charts) for which the commentary is generated (i.e., the last date and time loaded in the chart). To display the date in the long format (e.g., "Friday, September 20, 1998") append an ":L" (e.g., "<DATE:L>").

Notes

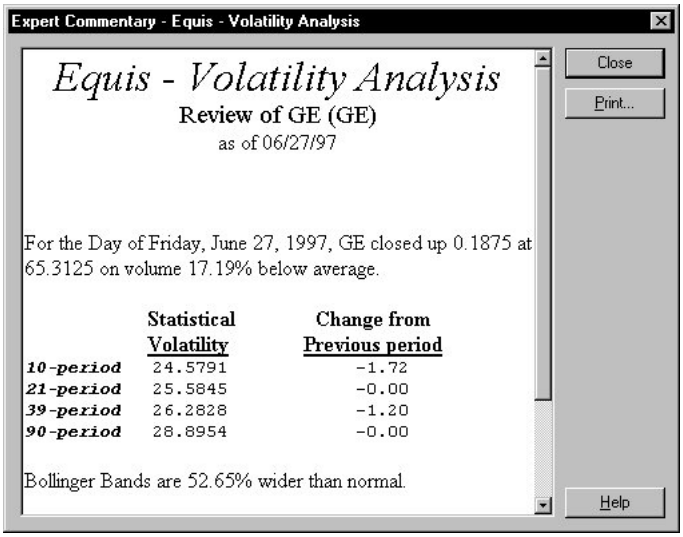
- Appending an ":S" or nothing at all, displays the default short format.
- The format of your date (both long and short) is controlled from the Regional Settings Properties dialog in the Windows Control Panel.

<EXPERT>. This displays the name of the expert.

The following commentary makes use of these constants.



The following is the resulting commentary.



Controlling the Look of Commentaries

You can control the way a commentary appears by using fonts, colors, formatting, bullets, and special control characters.

The Backslash

The backslash character (i.e., \) tells MetaStock to suppress the start of a new line. This prevents a lot of blank lines when the conditional text isn't displayed. For example, the following text will appear on five lines:

```
This
appears
on
five
lines.
```

Whereas, due to the backslashes, the following text appears on one line.

```
This \
appears \
on \
one \
line.
```

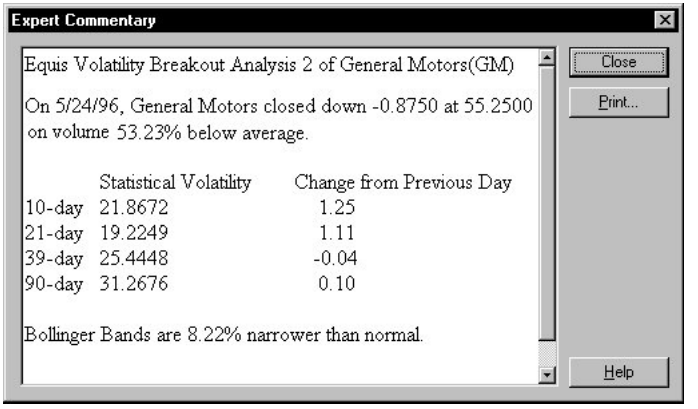
Note: A backslash *must* be followed by a carriage return.

To prevent blank lines from appearing when the nested conditional statements are not displayed, backslashes are used in the following example.

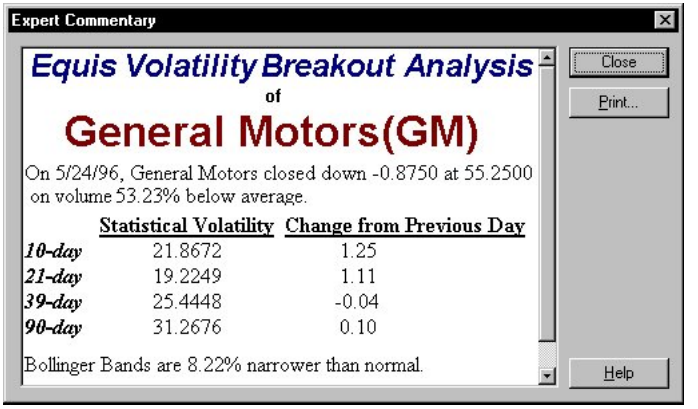
```
writeif(Highest(high)=high,"<Name> is making
new highs.")\
writeif(Lowest(low)=low,"<Name> is making new
lows.", "" )\
writeif(cross(macd(),mov(macd(),9,e)),"The
MACD is giving a new buy signal today
(<Date>).", "")\
```

Using Colors, Fonts, and Formatting

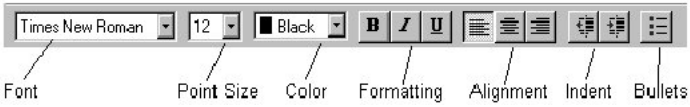
To make your commentaries more readable, you should take advantage of the word-processing tools on the commentary toolbar. You have a choice of multiple fonts, point sizes, colors, formatting, text alignment, and even bullets. A rather boring commentary that looks like this…



…can be brought to life by using the tools creatively:



To change the fonts, colors, and formatting of text within the expert commentary editor, use the toolbar at the top of the dialog.



Accelerator Keys

In addition to the buttons on the commentary toolbar, the following accelerators are also available when editing a commentary:

Bold toggle	CTRL+B
Underline toggle	CTRL+U
Italics toggle	CTRL+I
Center align paragraph	CTRL+E
Left align paragraph	CTRL+L
Right align paragraph	CTRL+R
Increase paragraph indent	CTRL+M
Decrease paragraph indent	CTRL+SHIFT+M
Find text	CTRL+F
Find next	F3
Replace text	CTRL+H

The standard Windows Edit controls also work within a commentary.

Cut To Clipboard	CTRL+X
Copy To Clipboard	CTRL+C
Paste From Clipboard	CTRL+V
Select All Text	CTRL+A
Undo Last Action	CTRL+Z
Redo Last Undo	CTRL+Y

Embedding Video, Sound, and Other Files in Commentaries

A great way to enhance an expert is to add multimedia and/or links to additional files (e.g., spreadsheets, docs, etc.) within a commentary. Video files, sound files, and other files (e.g., an Excel spreadsheet, WordPerfect document, etc.) can be pasted directly in an expert commentary. Several of the prepackaged experts that are shipped with MetaStock include linked video clips.

Files that are linked within a commentary are usually displayed as icons. When a commentary window for a specific chart is displayed, you can double-click on the icon to view the file. The necessary application to view (or run) the file is automatically launched.

You can link a file within a writeif() function in a commentary, thereby making the display of the file's icon dependent on the condition as shown below.

```
Writeif(cross(c,mov(c,21,s),"
```

```
")
```

Video Clip

In the above example, the video clip icon will only display in the commentary if the close has crossed above a 21-period moving average. Notice that the video clip icon is contained within quotes, just as regular text would be.

The following example shows an Excel spreadsheet linked within a writeif() function.

```
Writeif(rsi(14)>80 and fml("Volatility
Breakout")=1,"View this Excel spreadsheet for
additional analysis,
        ")
```

Worksheet

Of course, if you want the file's icon to always display in the commentary (several prepackaged experts have these), simply paste link it directly in the commentary editor box, outside of any writeif() functions. You can paste link a file by right-clicking on the file in the Windows Explorer and choosing Copy and then right-clicking on the commentary window in MetaStock and choosing Paste Special.

If the linked file represented by the icon has been moved, renamed, deleted, etc., and you double-click the icon to view it, nothing will happen since MetaStock does not know where the original file is located.

To paste a video, sound or other files into a commentary

1. Open the Windows Explorer.
2. Right-click on the file to copy and choose Copy from the shortcut menu.
3. In MetaStock, open the expert in which you want to copy the file and click the Commentary tab.
4. In the Commentary editor box, right-click where you want the file to be inserted.
5. Choose Paste Special from the shortcut menu.
6. From the Paste Special dialog, choose the Paste Link radio button.
7. If you want the file displayed as an icon in your commentary, check the Display As Icon box.

Accessing the Videos on the MetaStock CD

If you chose not to install the multimedia files on your hard disk during the installation of MetaStock, you can still view the video clips from the MetaStock CD by manually editing the link within the commentary.

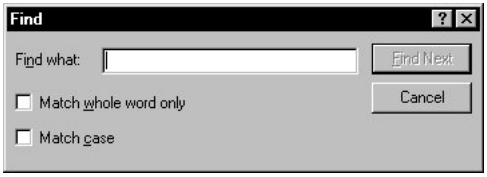
To access video directly from the MetaStock CD

1. In MetaStock, edit the expert that you want to view the video in and click the Commentary tab.
2. Right-click anywhere within the Commentary editor box. You can do this even if it says "Formula is password protected or read-only."
3. Choose Links from the shortcut menu.
4. Click the **Change Source** button from the Links dialog and locate the correct AVI file from the `\experts` folder on the MetaStock CD.
5. Click the **Update Now** button in the Links dialog and then click the **Close** button.

Note: The MetaStock CD-ROM must be in the CD-ROM drive if you want to view the videos. In addition, an operating system quirk prevents the path name shown with a video's icon from updating to reflect the new linked source.

Finding and Replacing Text in Commentaries

You can quickly locate text within a commentary by using the Find dialog. When editing a commentary press the CTRL+F key to display the Find dialog. You can press the F3 key to find the next occurrence of the text.

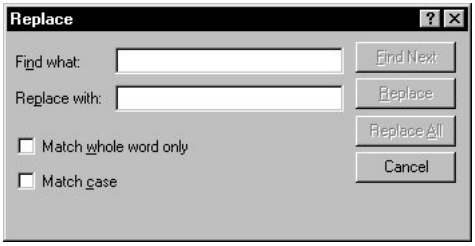


Find What. Type the text to search for.

Match Whole Word Only. Check this box to search for occurrences that are whole words and not part of a larger word.

Match Case. Check this box to distinguish between uppercase and lowercase characters.

You can find text and replace it with alternate text by using the Replace command. When editing a commentary press the CTRL+H key to display the Replace dialog.



Find What. Type the text to search for.

Replace With. Type the text to replace the text in the Find What box.

Match Whole Word Only. Check this box to search for occurrences that are whole words and not part of a larger word.

Match Case. Check this box to distinguish between uppercase and lowercase characters.

Replace. Click this button to replace the text in the Find What box with the text in the Replace With box.

Replace All. Click this button to replace *all* text in the commentary matching the text in the Find What box with the text in the Replace With box.

Different Ways to View Commentaries

The **Preview** *button allows you to view the output of the commentary*

There are several ways to view a commentary. When writing your commentaries, you'll want to use the **Preview** button in the Expert Editor dialog to see how things are turning out. Clicking this button shows you exactly how your commentary will appear when viewed in the Expert Commentary Preview Window. If there are errors in your commentary, you will be notified after clicking the **Preview** button.

Notes:

- The **Preview** button is disabled if no chart is open.
- A chart must be open in order to view a commentary, otherwise the **Commentary** button will be disabled.

To view the commentary

1. After the expert to which the commentary belongs has been attached to a chart, you can view the commentary by using one of the following methods:

   Right-click the chart and choose Expert Advisor, then Commentary from the shortcut menu.

   Choose Expert Commentary from the View menu.

   Expert Advisor button

   Click the Expert Advisor button on the standard toolbar.

   Select the commentary to view and then click the **Commentary** button.

   The Commentary Preview Window appears.
2. Use the Commentary Preview Window if you want to quickly scan through multiple commentaries. If no chart is displayed, the **Commentary** button is disabled.

Docking the Commentary Window

The Commentary Window (not the Commentary Preview Window) can be docked on the top, bottom or sides of the screen.

To dock the Commentary Window

Drag the Commentary Window so that it overlaps the side of the screen by which you want to dock and release the mouse button.

To undock the Commentary Window

Double-click just to the right of the Commentary Window's toolbar to undock.

To change the size of a docked Commentary Window

To change the size of a docked Commentary Window, you must change the size prior to docking. If you dock the window on the left or right side of the screen, the width of the window (prior to docking) is retained. Likewise, if you dock the window on the top or bottom of the screen, the height of the window (prior to docking) is retained.

Changing Analysis Dates with the Commentary Window Displayed

By default the Commentary Window analyzes the last bar in the chart. However, you are not limited to just the last bar. Perhaps, you'd like to read what the commentary said just prior to the last market selloff. You can use the toolbar buttons in the Commentary Window to change from bar to bar, or you can click directly on the chart above or below the bar to analyze.

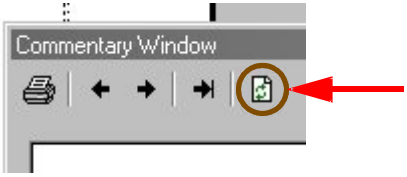
Note: This functionality is *not* available from the Commentary Preview Window displayed from within the Expert Advisor dialog.

Changing from bar to bar as described above is a quick and convenient way to test the output of your commentaries for different market conditions.

The bar that the commentary is analyzing is labeled with a small black triangle directly above the bar.

Commentaries Updating in Real-time

An option in the Application Properties dialog (page 41) controls when a commentary attached to a real-time chart is updated. You can choose whether the commentary should be updated with every tick, at the completion of each bar, or only when the **Refresh** button is pressed.



Complex commentaries attached to active real-time charts can be a significant drain on system resources. Therefore, you should be careful about choosing the Update Commentary on each tick option in the Application Properties dialog.

Tips for Writing Commentaries

- Take advantage of the font, color, formatting, bullets, etc. to enliven your commentaries (page 602).
- Create columns of indicator values by using the writeval() function in combination with width and decimal parameters (page 598).
- Use the backslash at the end of nested writeif() functions to avoid blank lines (page 601).
- Use constants to inform the reader about the security being analyzed (page 599). You may even make a standard header to appear at the top of every commentary.
- When writing a commentary and you want to preview the true text string of the logical formula in a writeif() statement, you can force the condition to true by placing the words “or true” after the logical formula. Likewise, the words “or false” after a logical formula will force the condition to false and allow you to preview the false text string.
- Instead of using generic words like “bars” or “periods” in commentaries, use the <periodicity> constant with the letter “s” immediately following it (e.g., `<periodicity>s`). This will return a much more descriptive “days”, “weeks”, etc., matching the periodicity of the chart.
- If you need to place quotes around a word in the true/false text of a writeif() statement, precede the quote with a backslash (i.e., `\"bearish\"`).
- Comments can be inserted within a commentary by placing the text in braces (i.e., `{}`). You may want to use comments to clarify complex functions. The text inside the braces will not display when the commentary is viewed.
- If a comment is entered on its own line, you will probably want to place a backslash (page 601) after the comment so that an extra carriage return does not show up in your commentary.
- See the prepackaged commentary named “Equis Instructional Commentary.”
- You can jump directly from a chart to its commentary by right-clicking on the chart, choosing Expert Advisor and then choosing Commentary.
- You can increase the size of the Expert Editor dialog by clicking on the border of the dialog and dragging. You may find this especially helpful when writing commentaries.
- When creating columns of text or numbers, use a fixed width font such as Courier or Courier New to help align columns neatly.

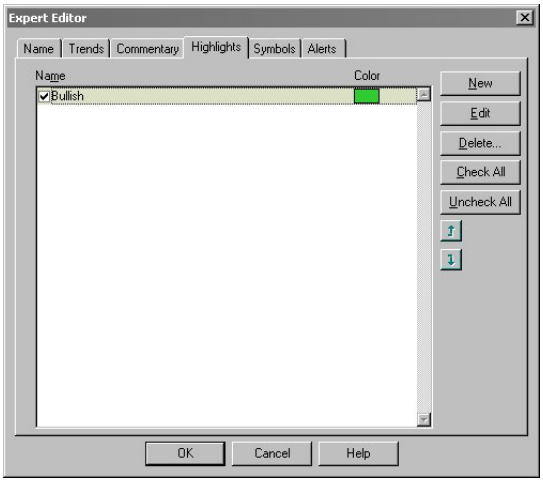
Using Highlights to Emphasize Specified Conditions

Highlights are a great visual tool for analyzing a chart. Since the focal point of a chart is the price bars, it only makes sense to have the display of the bars convey information about the technical status of the security. This is done with the use of color.

The Expert Advisor allows you to define an unlimited number of conditions that will cause the bars to change colors. For example, the bars could be colored red when the RSI is above 80, blue when its below 20, and black when its between 20 and 80. A simple concept, yet amazingly convenient and powerful.

Creating and Editing Highlights

Highlights are created and edited from the Highlights page of the Expert Advisor dialog. Highlights are enabled by checking the box to the left of the highlight's name.



New. Choose this to create a new highlight. The Expert Highlight Editor appears from which you can specify the name, conditions, and color for a highlight.

Edit. Choose this to edit the selected highlight. The Expert Highlight Editor dialog appears.

Delete. Choose this to delete the selected highlights.

Check All. Click this button to enable (check) all highlights. If you select only a portion of the highlights, only those selected are enabled.

Uncheck All. Click this to disable (uncheck) all highlights. If you select only a portion of the highlights, only those selected are disabled.

Move Up button

Move Down button

Move Up. Click this button to move the selected highlight up the list. The higher a highlight is on the list, the higher the priority it is given.

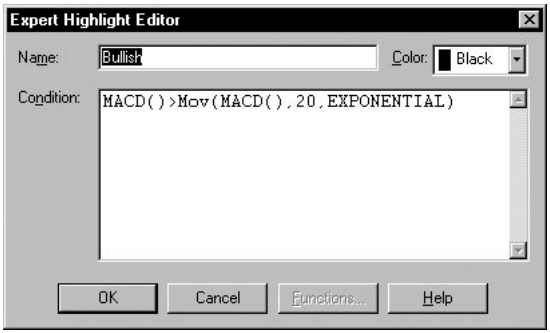
Move Down. Click this button to move the selected highlight down the list. The higher a highlight is on the list, the higher the priority it is given.

For information on priority, see page 615.

Specifying the Condition for a Highlight

As with the other components in the Expert Advisor, the conditions for the highlights are written in the MetaStock formula language (page 415). They are evaluated as either true or false. A true condition will cause the price plot to be drawn (highlighted) in the specified color. If the condition is false, prices are displayed in the colors specified on the Color/Style page of the Price Plot properties dialog (page 172).

You use the Expert Highlight Editor dialog to specify the condition and the color to use for a highlight. This dialog is accessed by choosing New or Edit from the Highlights page of the Expert Editor dialog (page 611).



Name. Enter the name for the highlight. You should use a name that is descriptive of the highlight (e.g., “RSI/Moving Average Bullish”). The maximum length of the name is 40 characters.

Condition. Enter the formula to use for the highlight. If the formula is true for a given time period (i.e., day, week, month, etc.), the price plot will be highlighted with the selected color. Click the **Functions** button if you need help with the MetaStock formula language. Formulas must be written in the MetaStock formula language (page 415).

Color. Choose the color from the drop list box. This is the color that will be used when the highlight’s condition is true.

Functions. Click this button to display the Paste Functions dialog (page 420).

Note: This button is enabled only when the cursor is in the Condition box.

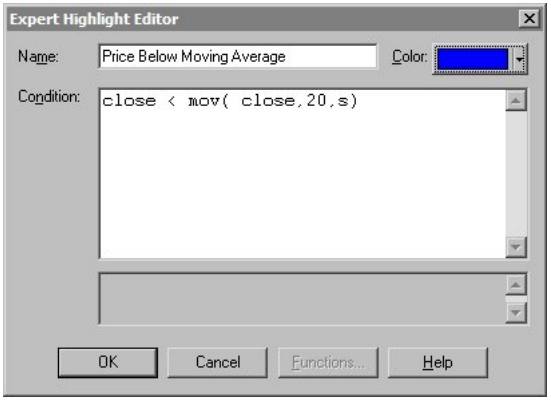
Viewing the Results of Highlights

As with all components of an expert, you must attach the expert containing the highlight to a chart in order to see the results.

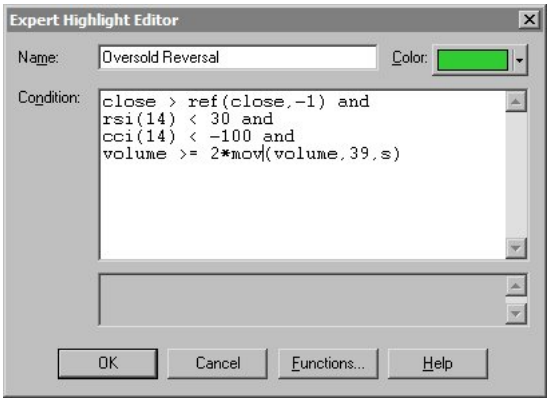
Sample Highlights

The following illustrations show some examples of highlights.

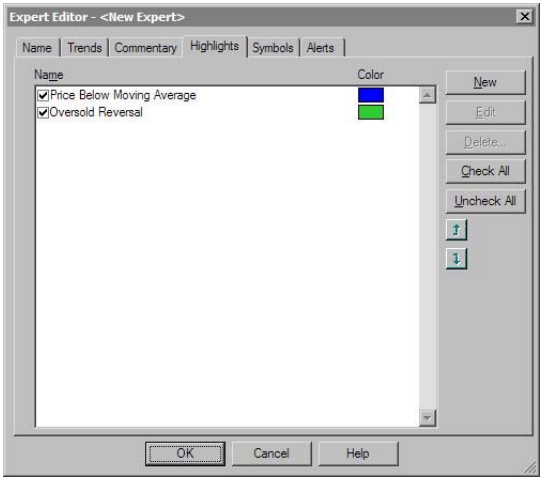
This highlight colors the bars blue when the close is below its 20-period moving average.



This highlight colors the bars green when the closing price is up, the RSI is below 30, the CCI is below -100, and volume is twice its average.



You can also combine multiple highlights. For example, the previous two highlights could both be enabled simultaneously from the Highlights page as shown below. Notice that the checked boxes indicate that both highlights are enabled.



To view the results of a highlight

1. Open a chart.
2. Choose Expert Advisor from the Tools menu.
3. Choose the expert that contains the highlights and choose Edit.
4. Click the Highlights tab.
5. Check the box next to the desired highlight(s), and click the **OK** button.

6. Choose Attach from the Expert Advisor dialog.
   The price plot on the chart should now redraw to reflect the highlight contained within the attached expert.
7. Click the **Close** button in the Expert Advisor dialog.

Priority

Move Up/Dn buttons

When the conditions for these highlights are evaluated, the highlight that appears at the top of the list is given highest priority. Use the Move Up and Move Down buttons to change the priority.

In this case, the highlight named “Oversold Reversal” is given the highest priority since it is listed first. This means that if the conditions for both the Oversold Reversal and the RSI/CCI are true on the same day, the Oversold Reversal highlight will take precedence. The bar would be colored green.

Tips for Using Highlights

- Highlights and Trend ribbons (page 592) are very similar. Both are used emphasize price zones when a specified condition is true.
- Highlights are best used for conditions that stay true over time.
- Symbols are best to mark conditions that are triggered momentarily (i.e., moving average crossovers).

Using Symbols to Identify Key Points on Charts

Symbols provide a great way to mark points on your chart where specified conditions are met.

Expert Symbols can be distinguished from other symbols by the small “e” that appears next to them.

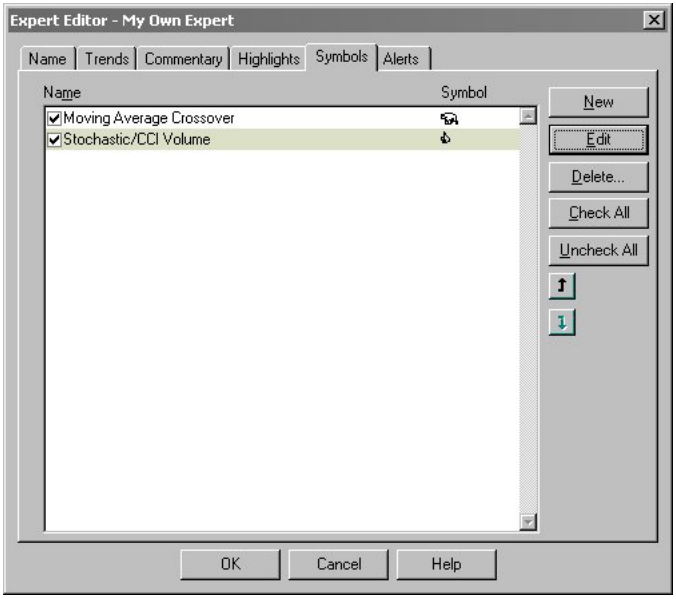
Conceptually, symbols are almost identical to highlights. In fact, the only difference is the way the results are displayed on the chart.

The Expert Advisor allows you to define an unlimited number of conditions that will cause the specified graphic or text to appear above or below the price bar that triggered the condition “true.” For example, a bull graphic could be placed below the price bar on the day when the RSI crosses above 20— a bear graphic when the RSI crosses below 80.

If you use the Enhanced System Tester, this may be just the tool you’ve been looking for. It’s like having your chart constantly being monitored by a system test. Much like the results of the buy/sell signals of a system test are displayed with arrows on your chart, the Expert Advisor’s symbols feature can keep you up-to-date on conditions in your chart.

Creating and Editing Symbols

Symbols are created and edited from the Symbols page of the Expert Advisor dialog. Symbols are enabled by checking the box to the left of the symbol's name.



New. Choose this to create a new symbol. The Expert Symbol Editor appears from which you can specify the name, conditions, and graphic/text for a symbol. For more information on this dialog, see page 616.

Edit. Choose this to edit the selected symbol. The Expert Symbol Editor dialog appears (page 616).

Delete. Choose this to delete the selected symbol.

Check All. Click this button to enable (check) all symbols. If you select only a portion of the symbols, only those selected are enabled.

Uncheck All. Click this button to disable (uncheck) all symbols. If you select only a portion of the symbols, only those selected are disabled.

Move Up button

Move Down button

Move Up. Click this button to move the selected symbol up in the list. The higher a symbol is on the list, the higher the priority it is given.

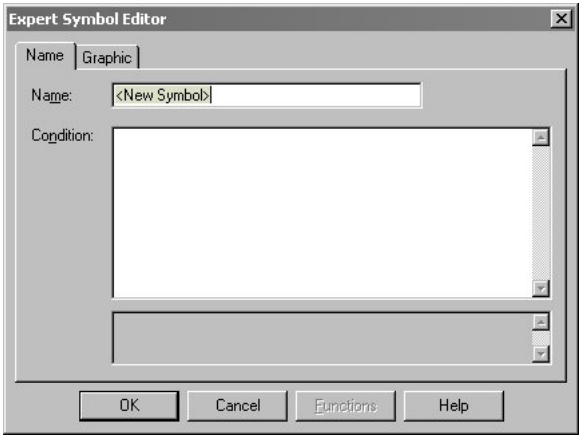
Move Down. Click this button to move the selected symbol down in the list. The higher a symbol is on the list, the higher the priority it is given.

For more information on this priority, see page 615.

Specifying the Condition for a Symbol

As with the other components in the Expert Advisor, the conditions for symbols are written in the MetaStock formula language (page 415). They are evaluated as either true or false. A true condition will cause the symbol to be drawn near the price plot using the specified graphic and/or text.

You use the Expert Symbol Editor dialog to specify the formula condition and the graphic/text to use for a symbol. This dialog is accessed by choosing New or Edit from the Symbol page of the Expert Editor dialog (page 616).



Name. Enter the name for the symbol. You should use a name that is descriptive of the symbol's condition (e.g., "RSI/Moving Average Bullish"). The maximum length of the name is 40 characters.

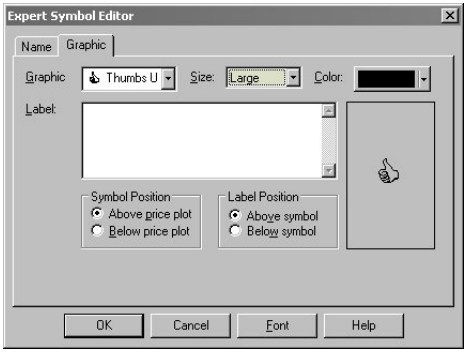
Condition. Enter the formula to use for the symbol. If the formula is true for a given time period (i.e., day, week, month, etc.), the price bar will be marked with the selected graphic and/or text. You may want to click the **Functions** button if you need help with the MetaStock formula language. Formulas must be written in the MetaStock formula language (page 415).

Functions. Click this button to display the Paste Functions dialog (page 420).

Note: This button is enabled only when the cursor is located within the Condition box.

Defining the Symbols to Display

The Symbols page of the Expert Symbol Editor dialog is used to define the graphic and label to use for the symbols. Note that a symbol does *not* have to contain both a graphic and a label.



Graphic. Choose the graphic to display for the symbol from the drop-list. If you prefer not to have a graphic attached to the symbol, choose "(None)" from the drop-list.

Size. Choose the size of the graphic (but not the label), from the drop-list. Use the **Font** button to change the size of the label.

Color. Choose the color for the graphic (but not the label) from the drop-list. Use the **Font** button to change the color of the label.

Label. Enter the label to display for the symbol. A label can contain up to 40 characters, including line feeds. If you prefer not to display a label, simply leave the box blank.

Symbol Position. Choose the location for the graphic.

Label Position. Choose the location for the label.

Font. Click this button to display the standard Windows Font dialog. This dialog is used to change the font, color, and style of the label.

Viewing the Results of Symbols

As with all components of an expert, you must attach the expert containing the symbol to a chart in order to see the results.

To view the results of a symbol

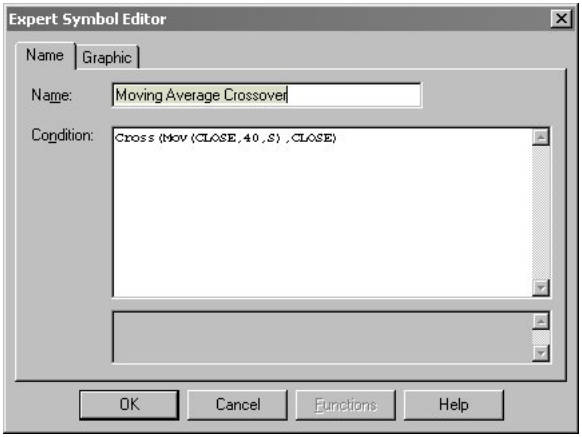
1. Open a chart.
2. Choose Expert Advisor from the Tools menu.
3. Choose the expert that contains the symbol(s) and choose Edit.
4. Click the Symbols tab.
5. Check the box next to the desired symbol(s).
6. Click the **OK** button.

7. Choose Attach from the Expert Advisor dialog. The chart will now redraw to reflect the symbol contained within the attached expert.
8. Click the **Close** button in the Expert Advisor dialog.

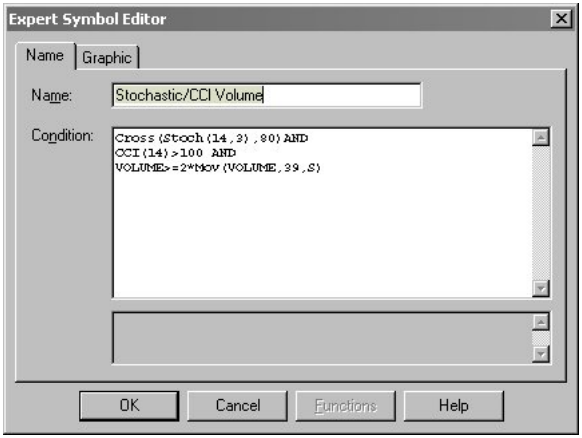
Sample Symbols

The following illustrations show some examples of symbols.

This symbol draws a graphic of a bear below the price bar when the close crosses below its 40-period moving average.

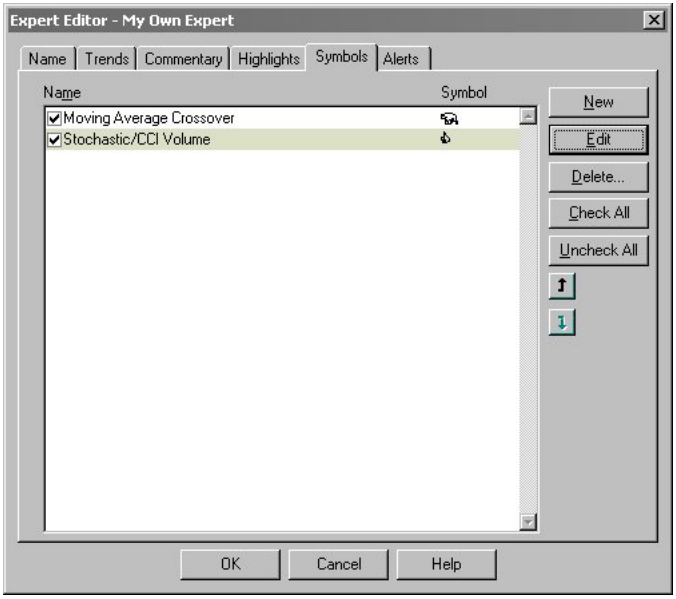


This symbol places the label “Overbought” if the Stochastic crosses above 80, the CCI is above 100, and volume is twice its average.



You can also combine multiple symbols. For example, the previous two symbols could both be enabled simultaneously from the

Symbols page as shown below. Note that the checked boxes indicate both are enabled.



Move Up/Dn buttons

When the conditions for these symbols are evaluated, the symbol that appears at the top of the list is given highest priority. Use the Move Up and Move Down buttons to change the order.
In this case, the symbol named “Moving Average Crossover” is given the highest priority since it is listed first. This means that if the conditions for both Moving Average Crossover and the Stochastic/CCI/Volume are true on the same day, only the Moving Average Crossover symbol will be displayed.

Tips for Using Symbols

- Highlights are best used for conditions that remain true over a period of time. Symbols are best to mark conditions that are triggered momentarily (i.e., moving average crossovers).
- Symbols in combination with Alerts provide a great way to keep abreast of the signals generated by your favorite system test. In fact, you may want to copy the system test rules into the Expert Symbol Editor dialog and the Expert Alert Editor dialog so that they are constantly monitored.

Using Alerts to Grab Your Attention

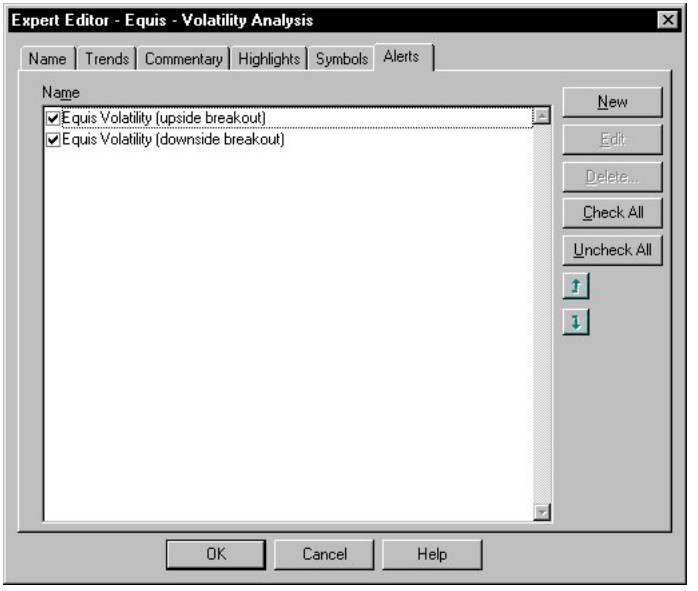
Alerts give you the ability to ensure that you stay in touch with current conditions in your chart, even when you're away from the office. An alert is defined just like highlights and symbols. However, where highlights and symbols are activated on all the data loaded in the chart, alerts are displayed only if the condition is "true" for any new bars since the chart was last opened. (When you first attach an expert to a chart, alerts will be triggered only for the last bar in the chart.)

The Expert Advisor allows you to define an unlimited number of alerts. When the alerts are triggered, you can be notified by a message box on your screen, play a sound or video file, or send notification to an email address or pager. For example, you could define an alert that would pop-up and play a sound file of the *Star Spangled Banner* whenever your U.S. Treasury Bond prices fall below the lower Bollinger Band. Or maybe you'd like a video clip of fireworks displayed whenever IBM's 14-day RSI falls below 70 on twice the average volume. There's nothing wrong with being a little creative and having some fun with these tools.

For those that use the Enhanced System Tester, this may be just the tool you've been looking for. It's like having your chart constantly being monitored by a system test. Much like the results of the buy/sell signals of a system test are displayed with arrows on your chart— the Expert Advisor's Alert feature can be used to keep you up-to-date on conditions in your chart.

Creating and Editing Alerts

Alerts are created and edited from the Alerts page in the Expert Advisor dialog. Alerts are enabled by checking the box to the left of the alert's name.



New. Choose this button to create a new alert. The Expert Alert Editor appears from which you can specify the name, conditions, and define the pop-up message and WAV or AVI file to play. For more information on this dialog, see page 622.

Edit. Choose this button to edit the selected alert. The Expert Alert Editor dialog appears.

Delete. Choose this button to delete the selected alert.

Check All. Click this button to enable (check) all alerts. If you select only a portion of the alerts, only those selected are enabled.

Uncheck All. Click this button to disable (uncheck) all alerts. If you select only a portion of the alerts, only those selected are disabled.

Move Up button

Move Up. Click the Move Up button to move the selected alert up in the list. This has no effect on the priority given to an alert. All alerts are given equal priority.

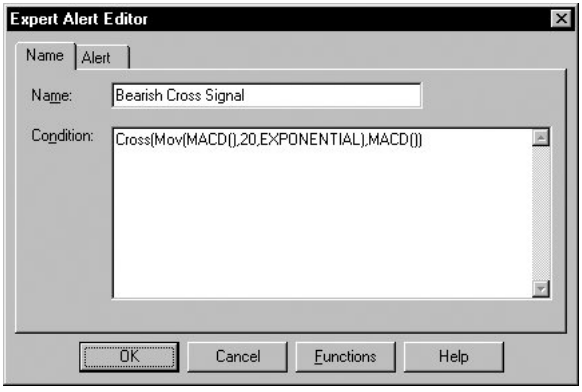
Move Down button

Move Down. Click the Move Down button to move the selected alert down in the list. This has no effect on the priority given to an alert. All alerts are given equal priority.

Specifying the Conditions for an Alert

As with the other components in the Expert Advisor, the conditions for alerts are written in the MetaStock formula language (page 415). They are evaluated as either true or false. A true condition on any bar more current than the last time the chart was opened will cause the alert to trigger and display the specified pop-up message, or play the accompanying sound or video file (if available), and send notification via email or a pager. (When you first attach an expert to a chart, alerts will be triggered only for the last bar in the chart.)

You use the Expert Alert Editor dialog to specify the formula conditions and how you want to be notified that the alert has been triggered. This dialog is accessed by choosing New or Edit from the Alert page in the Expert Editor dialog (page 622).



Name. Enter the name for the symbol. You should use a name that is descriptive of the alert's condition (e.g., RSI/Moving Average Bullish). The maximum length of the name is 40 characters.

Condition. Enter the formula to use for the alert. When first attaching the expert, the alert will trigger if the formula is true for the most recent period loaded in the chart. When opening the chart after the expert is attached, the alert will trigger if the formula is true for any bars that are more current than the last time you opened the chart. You may want to click the Functions button if you need help with the MetaStock formula language. Formulas must be written using the MetaStock formula language (page 415).

Functions. Click this button to display the Paste Functions dialog (page 420). You may want to click the Functions button if you need help with the MetaStock formula language (page 415).

Note: This button is enabled only when the cursor is located within the Condition box.

Defining the Alert

The Alerts page of the Expert Alert Editor dialog is used to define the pop-up message, WAV or AVI file to play, and whether or not to send notification by email or pager when the alert is triggered. Note that a alert does *not* have to contain both a message and a multimedia file.

Message. Enter the message to display when the alert triggers. You can enter up to 40 characters.

Text Only. Choose this button if you want only the specified text message shown in the Message box to display when an alert is triggered.

Play Video. Choose this button if you want the specified video file shown in the Video File box to play when an alert is triggered.

Play Sound. Choose this button if you want the specified sound file shown in the Sound File box to play when an alert is triggered. Check the accompanying "Repeat Sound" box if you want the sound file to repeat playing once it is triggered. You can stop the sound from playing by clicking the **OK** button in the pop-up Expert Alert dialog.

Play button

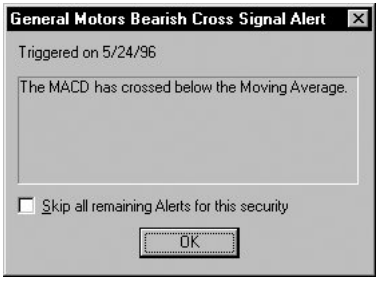
Sound/Video File. Enter the folder and file name of the sound or video file to play. Sound files have a WAV file extension. Video files have an AVI file extension. There is no limit to the size of the sound or video file you can play. Use the **Browse** button if you need to search your disk. Once the path and file name are entered, you can click the play button to test the playback.

Send alert to email recipient. Check this box to send an email message to the recipient listed in Application Properties (page 41) when this alert is triggered.

Send alert to pager. Check this box to send a notification of the triggered alert to the pager specified in Application Properties (page 41).

Viewing Triggered Alerts

Each time a chart is opened after an alert has been attached to the chart, the alert conditions are checked to see if any alerts have triggered. If an alert is triggered for any period that is more current than the last time the chart was opened, the Expert Alert dialog will appear.



This dialog shows the date on which the alert triggered, and displays the message specified in the Expert Alert Editor. email and pager notifications associated with the alert are also sent. If a sound or video file was attached to the alert, it will begin playing. Click the OK button to remove the dialog and stop the sound or video. If other alerts remain to be displayed, you can click the Skip all remaining alerts for this security box to keep them from popping up. Any email and pager alerts will be sent, however.

Alerts can also be triggered if you change the periodicity (page 121). For example, an alert that was not triggered on daily data may be triggered if the periodicity is changed to weekly.

Tips for Using Alerts

- When you open a chart with an expert attached, any email or pager alerts that are triggered for any bar more current than the last time you opened the chart will be sent. If you do not want these notifications to be sent, you can edit the Expert Advisor, or go into Application Properties (page 41) and disable email and pager alerts before opening the charts.
- For those that have the ability to record their own sound or video files, you may find it useful (and even fun) to attach a multimedia

file to your alerts. When the alert is triggered, the sound or video file will begin playing—informing you in plain English (or Spanish, German, etc.) what has occurred. You can use the Sound Recorder (located in the Windows Multimedia folder) to record your own sound files.

- Symbols in combination with Alerts provide a great way to keep abreast of the signals generated by your favorite system test. In fact, you may want to copy the system test rules into the Expert Symbol Editor dialog and the Expert Alert Editor dialog so that they are constantly monitored.

Attaching an Expert to a Chart

After you have created an expert, you must attach the expert to a chart in order for it to function. As mentioned earlier, an expert can contain just one or all five of the components. Most of your experts will probably contain just one or two components.

MetaStock's Smart Chart feature automatically saves the expert that is attached to a chart. So the next time you open the chart, the expert will automatically reevaluate your chart and display the updated results.

The **Attach**/**Detach** button in the Expert Advisor dialog is a toggle button. If an expert that is not already attached is selected, the button toggles to **Attach**. If the selected expert is already attached (i.e., a small triangle appears next to it), the button toggles to **Detach**. If no chart is open, the button is disabled.

A chart can only have one expert attached to it at a time. However, you can create multiple charts of the same security using the New Window command in the Window menu (page 89). After creating a "clone" of the selected chart, you can then attach another expert to it.

To attach an expert to a chart

Expert Advisor button

1. Open the chart to which you want to attach the expert.
2. Display the Expert Advisor dialog by doing one of the following:

- Choose Expert Advisor from the Tools menu.
- Click the Expert Advisor button on the standard toolbar.

3. Choose the desired expert from the Expert Advisor dialog and click the **Attach** button.
   or
   Right-click on the chart.
4. Choose Expert Advisor from the shortcut menu, then choose Attach.
5. Choose the desired expert from the Attach Expert dialog.

To detach an expert from a chart

Expert Advisor button

1. Open the chart that has the attached expert.
2. Display the Expert Advisor dialog by doing one of the following:

- Choose Expert Advisor from the Tools menu.
- Click the Expert Advisor button on the standard toolbar.

3. Select the attached expert from the Expert Advisor dialog (i.e., the one with the small triangle next to it) and click the **Detach** button.
   or
   Right-click on the chart's inner window.
4. Choose Expert Advisor from the shortcut menu, then choose Detach.

Copying and Deleting Experts

You can make a copy of a selected expert from the Expert Advisor dialog using the **Copy** button. This is useful when you need to design a new expert that is similar to an existing one.

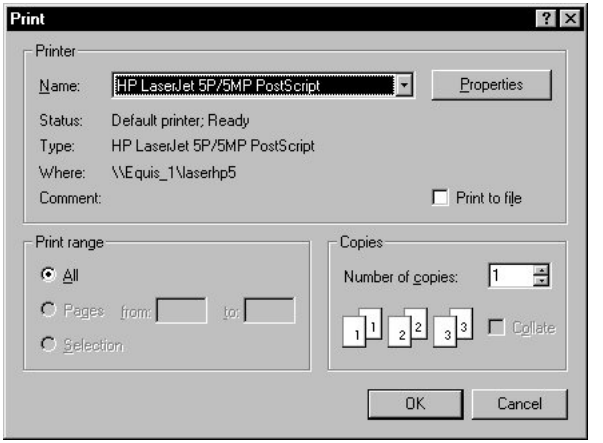
You can select multiple experts by holding down the CTRL *key as you click the mouse.*

For example, if Expert A was similar to a new expert you want to create, you could use the **Copy** button in the Expert Advisor dialog to make a duplicate rather than rewriting it. You could then make the minor modifications necessary and name it Expert B (or whatever).

You delete the selected experts from the Expert Advisor dialog using the **Delete** button.

Printing Experts

You can print the names and/or formulas of your experts with the Print dialog. To access the Print dialog, click **Print** on the Expert Advisor dialog.



Printer. Choose the desired printer from the drop-list.

Print Range. The All option is always enabled. All selected experts will be printed.

Copies. Enter the number of copies to print.

Prepackaged Experts

Many prepackaged experts are included with MetaStock. The experts written by Equis and shipped with MetaStock begin with "Equis" (i.e., Equis - Volatility Analysis). The experts written by industry experts (e.g., Pring, Raff, Fishback, etc.) begin with their name (e.g., Don Fishback – ODDS™ Option Analyst).

IMPORTANT: Equis International is *not* a Registered Investment Advisory service. The experts included with MetaStock are for educational purposes and are to be *used at your own risk.* Equis International (or its partners) is not liable for the investment decisions you make based on information obtained from the Expert Advisor.

Input() Function, Variables, and Multi-plot Indicators

The Expert Advisor will accept assigned variables (page 425) in trends, commentaries, highlights, symbols, and alerts.

In commentaries, however, variables must always be assigned within a `writeif()` or `writeval()` formula. In other words, you cannot write a commentary that appears as follows:

```
myvar:=mov(c,200,s);
writeif(c>myvar,"The close is above it's
200-period moving average");
writeif(myvar>ref(myvar,-10),"The 200-period
moving average is trending up.");
```

The syntax above is invalid because the assignment of the "myvar" variable is made outside of the `writeif()` functions. However, this could be correctly rewritten as follows:

```
writeif(myvar:=mov(c,200,s);c>myvar,"The close
is above it's 200-period moving average. ")\
writeif(myvar:=mov(c,200,s);myvar>ref(myvar,-1
0),"The 200-period moving average is trending
up.")
```

Note: The assignment of the variable "myvar" is made inside *each* of the `writeif()` functions. As is always the case when assigning variables, the variable assignment must be followed by a semi-colon. Although the use of variables in the example above does not seem very beneficial, you will find that assigning variables to long, complex formulas can make the commentary much easier to read.

An expert cannot use the input() function directly (page 451). This function is reserved for custom indicators only. However, if an expert uses the fml() function (page 446) to call the results of a custom indicator, and the custom indicator uses the input() function, the fml() function will only return the assigned default input value—the expert will not prompt for input.

If an expert contains or references (using the fml() function) a multi-plot indicator, only the last plot is used in the calculation of the exploration.

Expert Advisor Tips

- Due to the way the Performance indicator is calculated (its values are dependent on the amount of data loaded in the chart), you may experience inconsistent results if you use it. Therefore, we recommend that you avoid using the Per() function in experts.
- You can reference an indicator in a chart by selecting the indicator (i.e., clicking on it so handles appear) and then substitute the "P" variable (page 429) in place of a formula's data array. For example, the formula "mov(p,10,s)" would calculate a 10-period moving average of the selected indicator. Note that "P" will represent the plot selected at the time the expert is attached to the chart.
- If you aren't familiar with the MetaStock formula language, you really should learn how to use the Indicator Builder and Enhanced System Tester. The Indicator Builder and Enhanced System Tester are the key building blocks for the Expert Advisor.
- You can jump directly from a chart to its commentary by right-clicking on the chart, choosing Expert Advisor and then choosing Commentary.
- You can increase the size of the Expert Editor dialog by clicking on the border of the dialog and dragging. You may find this especially helpful when writing commentaries.

Experts are saved with templates and smart charts.

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Execution Errors in an Expert

The Error Executing Expert dialog will appear if a run-time error occurs while calculating an expert. Any error that is not a “math” error qualifies as a run-time error.

Remove this Expert from the chart. The expert is removed from the chart so that it will not calculate again.

Keep this Expert in the chart. The expert will calculate again with the next data update of the chart and any errors that occur will be reported.

Don't show future errors for this Expert in this chart. The expert will calculate again with the next data update of the chart. Any errors that occur will not be reported. Note that the errors will be suppressed only for the expert in the current chart.

Note: This dialog may also appear if you changed the folder listed in the File Locations page in the Application Properties dialog (page 41).

Working with the Internet

Internet Integration

The Internet can be a useful source of information, if you know where to look. MetaStock is seamlessly integrated with the Internet, providing instant access to many exclusive resources that help you make more informed trading decisions.

Some of the things you can do with MetaStock and the Internet are:

- Collect data from an online data vendor using DataOnDemand™
- Collect local data from an end-of-day vendor
- Email a bitmap graphic of a chart directly from MetaStock
- Save the active chart as an HTML document
- Request a current intraday quote for the active chart
- Read current company news for the active chart
- Research fundamental information for the active chart
- Display option chains for the active chart
- Launch the Equis International home page
- Learn about technical analysis with the online version of *Technical Analysis from A to Z*
- Find a MetaStock user group in your area
- Get help from Equis technical support

…and more.

Many of these Internet resources are accessed from your chart's shortcut menu. To access information relevant to your current chart, right-click the background of the chart. Sharing your charts with others through email or HTML is done through the File menu. Other Internet resources are available by choosing **Help>** Equis on the Web.

Emailing Charts with the Send Command

You can use the Send command in the File menu to send charts via email. You must have one of the following email systems to use this feature:

- **MAPI.** Microsoft Exchange (or other mail systems compatible with the Messaging Application Programming Interface).
- **VIM.** Lotus cc:Mail (or other mail system compatible with Vendor Independent Messaging).

To send a chart via email

1. Open the chart you want to send.
   Make sure it is the selected chart.
   At this point, you may want to add text or analysis.
2. Choose **File>** Send.

Your MAPI or VIM compatible email software will run. A bitmap file of the MetaStock chart will automatically be inserted into a new message.

Saving Charts as HTML

Documents published on the World Wide Web and those on corporate intranets are usually written in a special scripting language called Hypertext Markup Language (HTML). MetaStock allows you to create a simple HTML file containing a chart and data that is readable by web browser software.

When a chart is saved as HTML, two files are created — an HTML file containing the data, and a graphical image of the chart. The image can be saved in either JPEG, which is more widely supported, or PNG format, which is smaller. The data is the same data that would be displayed in MetaStock's Data Window (page 182) for the last day (or column) on the chart.

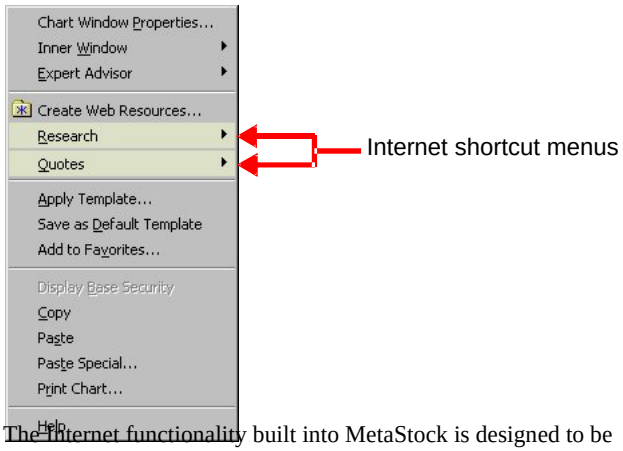
You can view an HTML file by opening it in a web browser such as Microsoft Internet Explorer or Netscape Navigator.

To save a chart as an HTML file

1. Choose **File>** Save As HTML from the menu.
2. Type a name for the HTML file in the File name box.
   Note: All HTML files are automatically assigned the extension "HTM". Be sure to save the file in a folder you will remember.
3. Choose the graphic format that you prefer.
4. Click **Save**.

Internet Shortcut Menus

Equis International has arranged exclusive Internet access to current quotes, news, options data, financial statements, insider trading, and more for MetaStock users. This free information is "chart-centric"—meaning that if you right-click on your chart of "Intel," choose "Research," and click "Company News" from the shortcut menu, news on Intel will be retrieved. Of course, to take advantage of this feature, the computer on which you installed MetaStock must be connected to the Internet.



The Internet functionality built into MetaStock is designed to be flexible enough that you can easily update MetaStock to add new Internet-specific features as they become available from Equis.

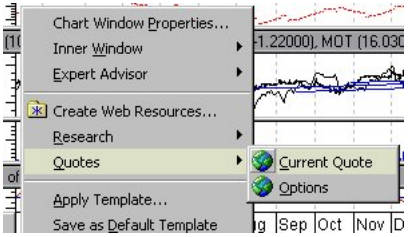
The # symbol represents a number equivalent to the MetaStock version installed. Example:`MS91MENU.DTA`

The choices that appear in the Internet shortcut menus are controlled by a file named `ms##menu.dta`. This file is located in your MetaStock program folder. The latest version of this file can be downloaded from the Equis web site at *www.equis.com*. We encourage you to check the web site periodically for the availability of a new version of the `ms##menu.dta` file.

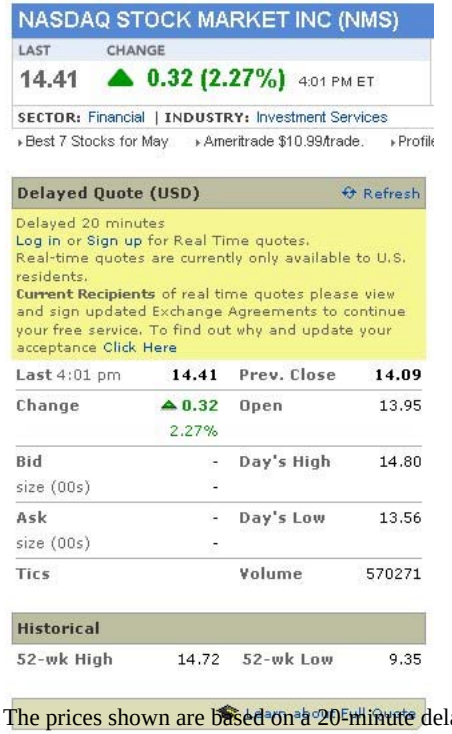
When you choose one of the Internet features from the shortcut menu, MetaStock automatically launches your default web browser software (e.g. Opera, Mozilla Firefox, Internet Explorer, etc.) and displays the web page containing the information.

The Quotes Menu

Current quotes and option chains are available from the Quotes shortcut menu.



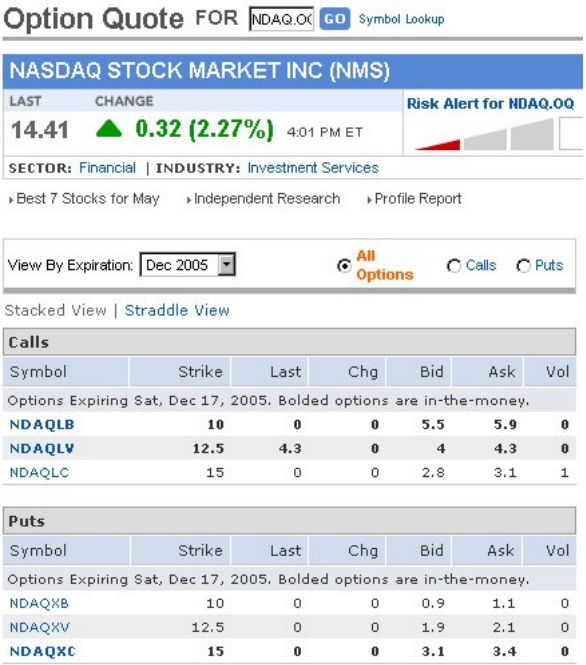
Current price data for the active chart is displayed by choosing Current Quote from the Quotes shortcut menu.



Note: *This is a partial image, showing the relevant portion of the complete page.*

The prices shown are based on a 20-minute delayed intraday price quote. To view company news for this security, you may choose the News link from this page.

A list of the put or call options available for the current chart can be displayed by choosing Options from the Quotes shortcut menu. This information is provided by Reuters, and is a MetaStock exclusive.


Option Quote FOR NDAQ.OQ GO Symbol Lookup

NASDAQ STOCK MARKET INC (NMS)

LAST 14.41 CHANGE 0.32 (2.27%) 4:01 PM ET

Risk Alert for NDAQ.OQ

SECTOR: Financial | INDUSTRY: Investment Services

Best 7 Stocks for May | Independent Research | Profile Report

View By Expiration: Dec 2005 All Options Calls Puts

Stacked View | Straddle View

Calls

Symbol	Strike	Last	Chg	Bid	Ask	Vol
Options Expiring Sat, Dec 17, 2005. Bolded options are in-the-money.						
NDAQLB	**10**	**0**	**0**	**5.5**	**5.9**	**0**
NDAQLV	**12.5**	**4.3**	**0**	**4**	**4.3**	**0**
NDAQLC	15	0	0	2.8	3.1	1

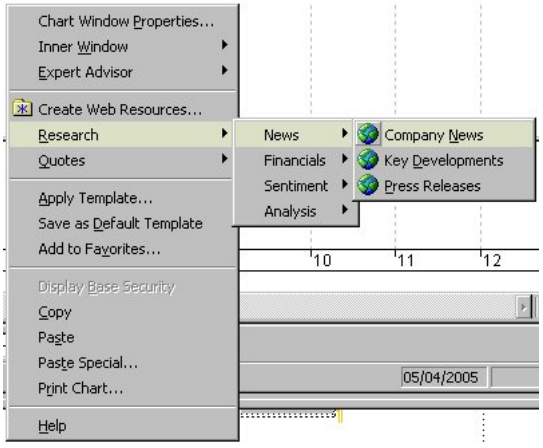
Puts

Symbol	Strike	Last	Chg	Bid	Ask	Vol
Options Expiring Sat, Dec 17, 2005. Bolded options are in-the-money.						
NDAQXB	10	0	0	0.9	1.1	0
NDAQXV	12.5	0	0	1.9	2.1	0
NDAQXC	**15**	**0**	**0**	**3.1**	**3.4**	**0**

Note: *This is a partial image, showing the relevant portion of the complete page.*

The Research Menu

News and fundamental data are available from the Research menu.



Current company news for the active chart is displayed by right-clicking and selecting Research> News> Company News. Click on a headline to view the news story.

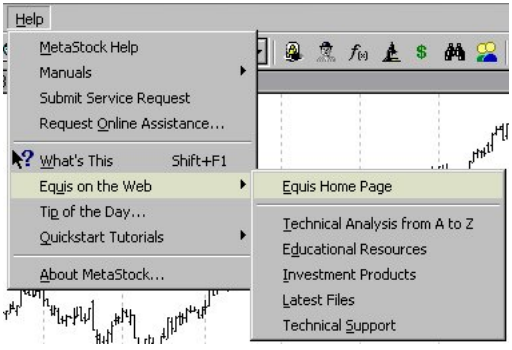
Note: *This is a partial image, showing the relevant portion of the complete page.*

Free Broker Recommendations and Research and a variety of fundamental data is also available, including Financial Highlights, Financial Statements, Insider Trading, Institutional Ownership, Performance/Short Interest, and Ratio Comparison.

Note: *This is a partial image, showing the relevant portion of the complete page.*

Equis on the Web

The information on the Equis International web site is available with just a few mouse clicks in MetaStock.
Choose **Help>** Equis on the Web to see a menu of options.



- Choose Equis Home Page to open the main Equis International web site in your web browser.
- Choose Technical Analysis from A to Z to read the online version of this book by the founder of Equis, Steve Achelis.
- Choose Educational Resources to find educational information about trading and MetaStock.
- Select Investment Products to learn more about the family of products available from Equis International.
- Choose Latest Files to view a list of the free downloads and updates available for Equis products.
- The Equis Technical Support is available via the Internet. Choose Technical Support to contact them.

Introduction to The DownLoader

What is it?

The DownLoader is a tool for creating and managing the files that MetaStock uses, and is automatically installed when you install MetaStock. MetaStock analyzes files (also called security files or data files), but it needs The DownLoader to build them first. The DownLoader can do a lot of things with the data files it creates (as this manual will show you), but its main purpose is to create data files for MetaStock to analyze.

The DownLoader performs five main tasks:

1. **Creating** MetaStock security files (page 663).
2. **Editing** MetaStock security files (page 673).
3. **Converting** security files from one format to another (page 702).
4. **Updating** the information contained in security files (page 670).
5. **Testing** the integrity of the security files (page 722).

The following chapters lay out how to use The DownLoader, and will enable you to create your own securities (see page 663), and update your security files either manually (see page 665) or using Reuters DataLink (see page 691).

You'll also want to be sure to take “A Quick Tour” on page 642.

Running The DownLoader

To run The DownLoader

1. Click the Windows **Start** button.
2. Select Programs> Equis International> The DownLoader

The DownLoader icon

Alternatively, you can click the “The DownLoader” icon in the MetaStock toolbar.

Express Download Command for The DownLoader

The DownLoader will respond to a new command line parameter (*-folder <folder name>*) by doing an express download on all securities within that folder and its subfolders.

Example:

```
C:\Program Files\Equis\
The Downloader\Dlwin.exe -folder
“C:\MetaStock Data”
```

Note: The above should be entered on a single line when used.

A Quick Tour

The DownLoader performs several key functions: creating, collecting, editing, testing, and converting data. This brief tour is designed to introduce you to the power and flexibility of The DownLoader and introduce you to each of these functions.

After completing this tour, you should be able to perform all the tasks necessary to manage your security data.

Creating a Security

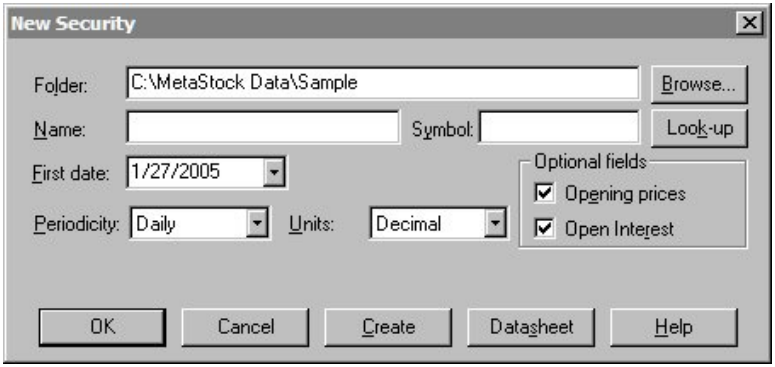
You may want to divide your securities into folders based on security type (e.g., stocks, futures, mutual funds, etc.).

To begin, we will create a data folder and the securities that you wish to manage. The New Security dialog is used to create securities and folders, and to look up symbol and exchange information for thousands of securities using the Symbol Database.

To make a data folder and create securities

New button

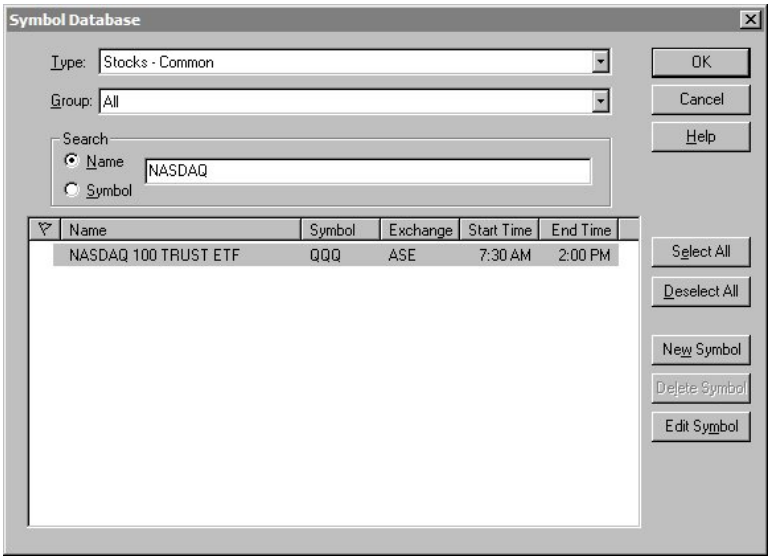
1. Select **File>** New> Security. The New Security dialog appears. This is where you can enter attribute information for the security.



2. In the Folder box, type the full path (including drive letter) to the folder in which you want to keep your security files (e.g. "`c:\MetaStock Data\Sample`").

   Note: If you click **Browse** , you can select a pre-existing data folder. See page 667 for more information.

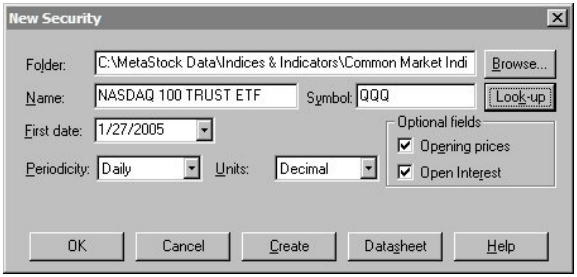
3. Click the **Look-up** button to display the Symbol Database dialog. This dialog lets you quickly fill in the security and ticker information in the New Security dialog. It can also be used to quickly create multiple security files (see page 668).



4. Type "*NASDAQ*" in the Search box.
5. Select **NASDAQ 100 TRUST ETF** from the list

The periodicity defines how data in the security file will be incremented. For example, weekly data will be Friday to Friday; monthly will be from month-end to month-end.

6. Click **OK** to close this dialog.
7. Select Daily as the Periodicity for the security data.
8. In the First Date box enter how far back you want to collect data. For our tour, enter "*01/01/98*".
   The dialog should now look like the following illustration:



9. Click **OK**.
   You could add multiple security files at this point, but for this tour, just add NASDAQ 100 TRUST ETF.

   Note: If the folder you typed in the Folder box does not already exist, The DownLoader will ask if you want to create the folder. Click Yes.

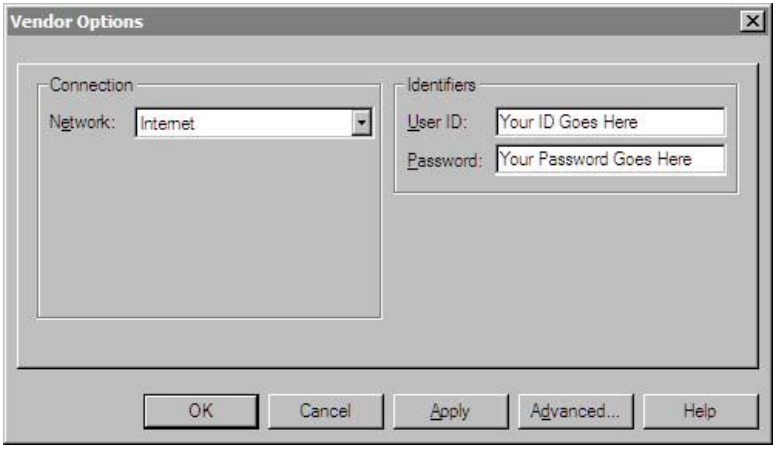
For this tour, we will demonstrate how to automatically update this security. For information on entering price data manually,
see page 665.

Collecting Data

After adding the new security, you are now ready to update the file with price data. Your first step is to configure your connection to Reuters DataLink. (This is done only once.) You can then update your securities.

To collect data

1. Select **Tools>** Vendor Options. The Options dialog appears.



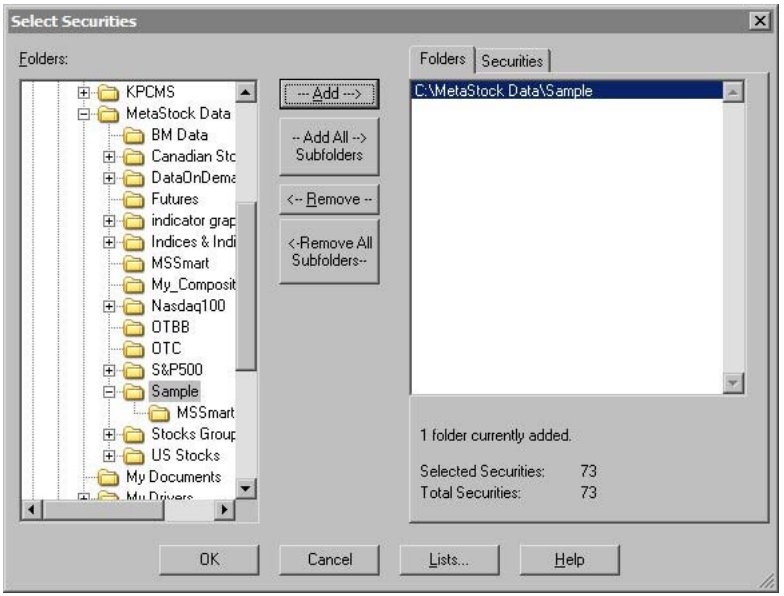
2. Fill out this page with the appropriate information and identifiers. Remember, if you need help completing the dialog, click **Help**.
3. Click **OK** when complete.

   Note: The identifiers and connection information are provided by Reuters DataLink. If you do not have this information, contact Reuters DataLink to get it.

Download Prices button

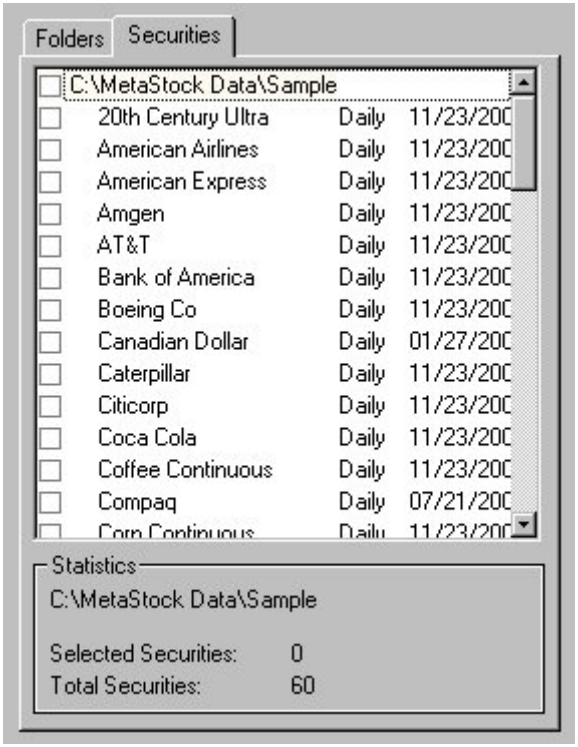
4. Select **Tools>** Download Prices to begin the data collection process. This is the procedure that you will perform whenever you want to update your security files.

The Select Securities dialog appears.



5. Locate and click the folder named "c:\MetaStock Data\Sample" in the **Folders** list on the left side of the dialog.
6. Click **Add**. The folder should now appear in the Selected Folders list on the right side.

7. Click the Securities tab to display the securities in the "c:\MetaStock Data\Sample" folder.



8. Click the box next to "C:\MetaStock Data\Sample" at the top of the list to deselect all the securities in the folder. The check marks disappear.
9. Scroll down the list until you see NASDAQ Composite.
10. Mark the box next to NASDAQ Composite to select it for updating.

11. Click **OK**.

12. Type the Ending Date for the collected data.
    Usually, you will just accept the default current date.
    Notice that the starting date was already specified when you added the security.
13. Click OK to start your collection.

Minimize button

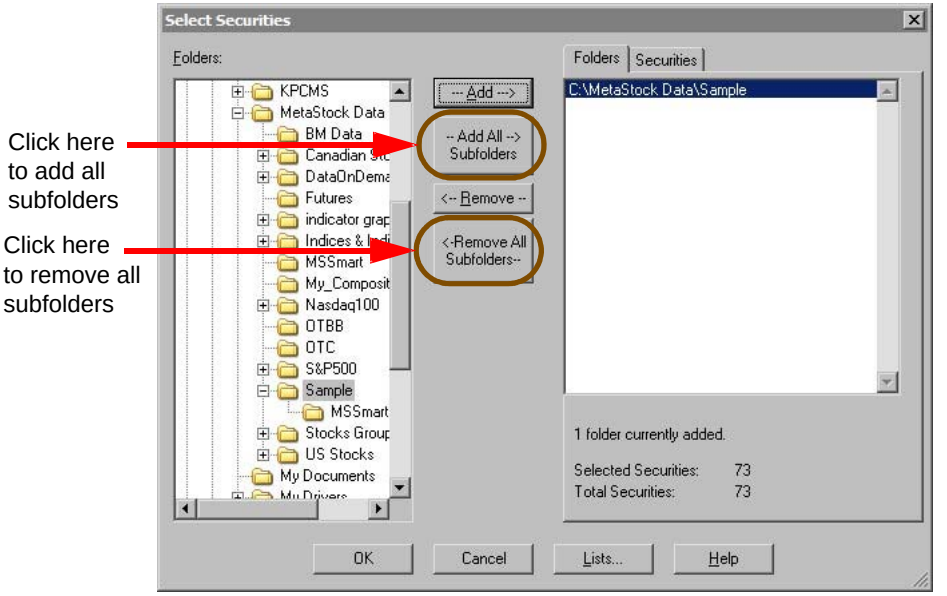
Note: The QuoteCenter window appears while you are connected. This window gives a "play-by-play" of the initialization, dialing, logging-on, and data collection process. While collecting data, you can minimize the QuoteCenter window and run other software if desired.

After the data for NASDAQ Composite is collected and stored, the Collection Report appears providing you with information about the success of the data collection.

Adding and Removing Subfolders from the Download

Sometimes you want to change the download status for not only the all the securities in a folder, but all securities in all the subfolders under it. The Select Securities dialog in The DownLoader allows you to add and remove complete trees of folders and subfolders.

Before now, when you selected securities to download, you could add all the securities in a folder and its subfolders as a block, but not remove them in the same manner. For MetaStock 11,
The DownLoader's Select Securities dialog allows you to both add and remove complete trees of folders and subfolders.



Selecting a folder and clicking **Add All Subfolders** adds the selected folder and any subfolders which contain MetaStock data files to the download list.

Selecting a folder and clicking **Remove All Subfolders**, removes the selected folder and any subfolders containing MetaStock data files from the download list.

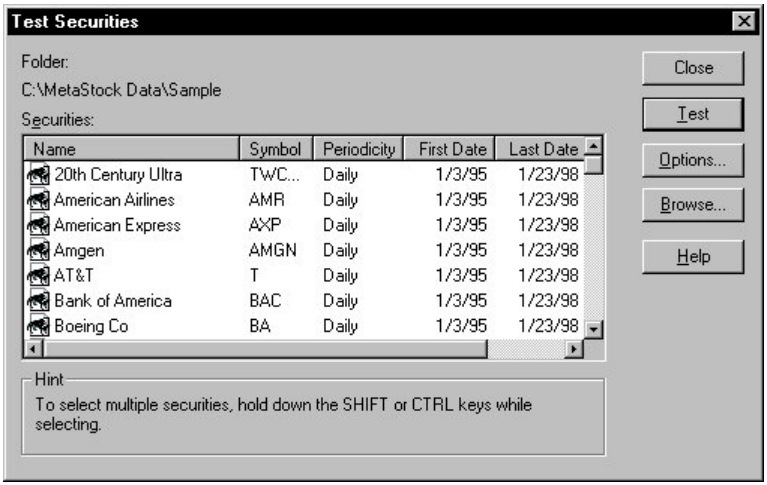
Testing the Data for Errors

Periodically, you will want to test your security files for errors. The DownLoader tests for over 100 possible error conditions. These errors include such problems as invalid dates, invalid high-low-close relationships, etc.

To test your security files for errors

1. Select **Tools>** Test. The Test Securities dialog appears.

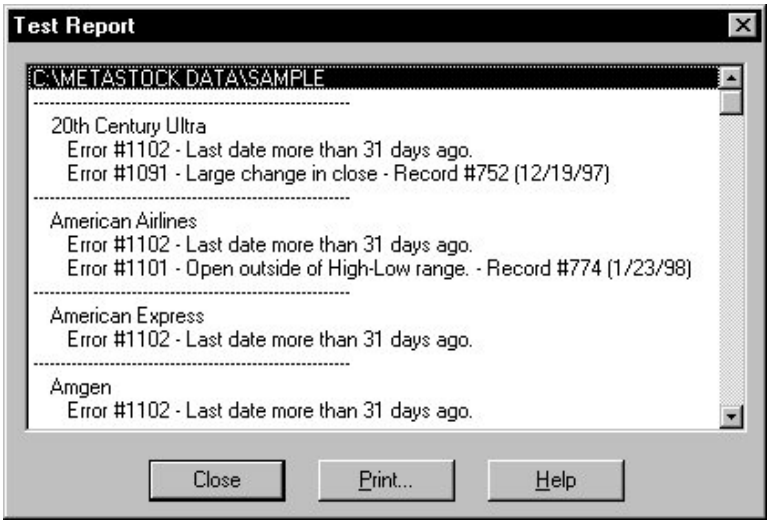
Test Securities button



2. Click **Browse** to select the folder that contains the data you want to test. For this tour, select the folder containing the NASDAQ Composite file we have been working with (i.e.,`c:\MetaStock Data\Sample`).
3. Click **Test** to begin the test. As the test is being performed, the Test Status dialog appears showing you which securities are being tested and the completion status.

Help screens are available at any point in The DownLoader. Simply click a Help button or press F1.

After the test is completed, the Test Report appears This report shows each security tested along with any errors found. If an error number appears on the report, you can simply double-click on the error and a help screen appears providing a description of the error condition. (See page 722 for more information on testing.)



Converting Data

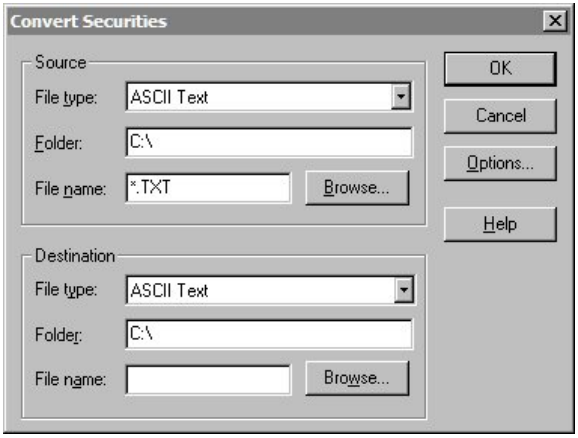
Another task The DownLoader performs is the conversion of your security files from one file format to another. Although this is a task most people rarely perform, it is convenient if you have the need.

Suppose you would like to do some specialized number crunching on your Intel data in another program. However, many programs cannot read MetaStock security files directly, therefore you must first convert the data to a format the program can read (often, either an ASCII or Excel format). This can be done with The DownLoader's convert feature.

To convert MetaStock data to an ASCII-formatted text file

Convert button

1. Select **Tools>** Convert to open the Convert Securities dialog. This dialog is divided into two sections—one for the Source file information and the other for the Destination file information.



In the Source ***section of the dialog:***

2. Select MetaStock from the File Type drop-down list.
3. Click **Browse** to select the File Name to convert.
4. Select "NASDAQ 100 TRUST ETF" and click **OK**.

   Note: You could add multiple security files at this point, but for this tour, just add NASDAQ 100 TRUST ETF.

In the Destination ***section of the dialog:***

5. Select ASCII Text from the File Type drop-down list.
6. Click **Browse** to select the Folder and File name to receive the converted data. For this tour, let's place the converted file on the Windows desktop.
7. Type "*NASDAQ_100_TRUST_ETF.TXT*" for the File Name.
8. Click **Save**.
9. Click **OK** to start the conversion process.
10. After the conversion is complete, the converted file NASDAQ_100_TRUST_ETF.TXT will be on your Windows desktop. You can then run your spreadsheet (or other application) and read the data.

Conclusion

Thank you for taking this tour of The DownLoader. You should now feel a little more comfortable with its capabilities. As mentioned earlier, the remainder of this manual is intended as reference material to be used on an “as-needed” basis. You are not expected to read the whole manual. You should use it when you need additional information about a specific feature of the program.

You may find that The DownLoader's help system provides you with the fastest and easiest method of finding information. If you need more information about a feature in The DownLoader, click **Help** (or press the F1 key). A help screen will immediately pop up, providing detailed information about the task at hand.

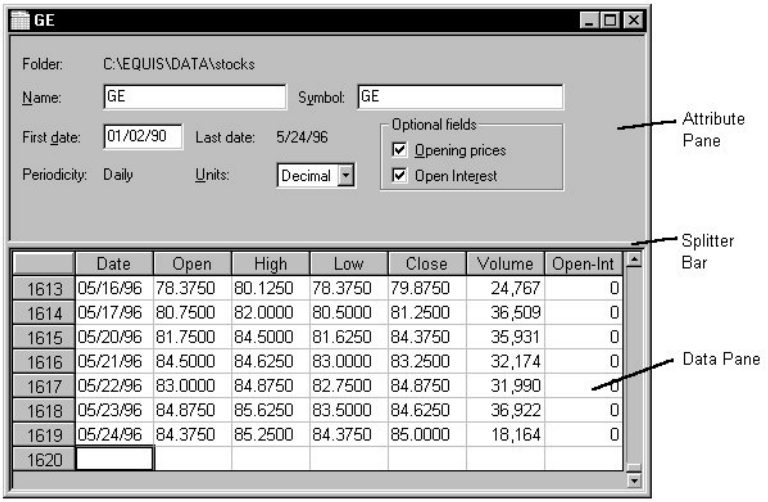
Good luck and enjoy!

The Datasheet

Security attributes and price data are maintained in a special form called a datasheet. A datasheet is to The DownLoader what a document is to a word processor. The datasheet is the heart of The DownLoader — it lets you view and work with your data.

Introduction

The top section of the datasheet (called the “attribute pane”) is where you enter the attributes of the security. The bottom section (called the “data pane") is where you enter the price data. The two panes are separated by a size-adjusting “splitter bar.” See page 657 for more information on using the splitter bar. You can switch between the two panes by clicking in the desired pane with the mouse or by pressing the F6 key.

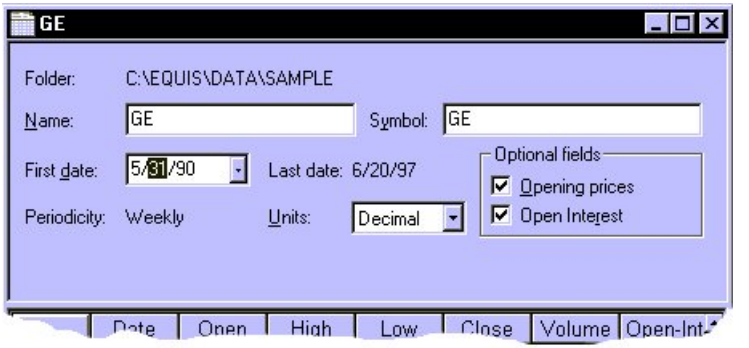


	Date	Open	High	Low	Close	Volume	Open-Int
1613	05/16/96	78.3750	80.1250	78.3750	79.8750	24,767	0
1614	05/17/96	80.7500	82.0000	80.5000	81.2500	36,509	0
1615	05/20/96	81.7500	84.5000	81.6250	84.3750	35,931	0
1616	05/21/96	84.5000	84.6250	83.0000	83.2500	32,174	0
1617	05/22/96	83.0000	84.8750	82.7500	84.8750	31,990	0
1618	05/23/96	84.8750	85.6250	83.5000	84.6250	36,922	0
1619	05/24/96	84.3750	85.2500	84.3750	85.0000	18,164	0
1620							

If you are accessing your data from a CD-ROM, the heading of the datasheet will display the label “Read-Only.” See “Accessing Data from a CD-ROM” on page 661 for more information about CD-ROM data.

Attribute Pane

The top pane of a datasheet is called the attribute pane. The attribute pane is used for entering the name, ticker symbol, periodicity and other information about the security.



Name. Type the name you want to assign to the security. If you leave this blank, The DownLoader automatically inserts the ticker symbol for the name.

Symbol. Type the ticker symbol for the security.

First Date. nter the first date for which you want to collect data. You can change the date using the drop-down calendar or enter the date manually.

If you need to collect data for an existing security prior to the date shown in the First Date box, you can change the starting date to an earlier date. The next time you perform a data collection; the earlier data will automatically be collected and appended to the beginning of the file. The first date may only be adjusted backward.
To change the first date to a later date, use either the Delete Data (page 716) or Delete Row (page 689) command.

If you need to adjust the first date for multiple securities, use the Adjust First Date command (page 699) in the **Tools** menu.

You specify the Last Date to collect at the time of data collection (page 702).

Units. . Choose the unit format in which you would like the price data to be displayed.
For example, if you choose “1/8,” the portion of the price to the right of the decimal will be displayed in eighths. Only the numerator is shown; the denominator is dropped (e.g., 25 3/8 is displayed as 25^3). If you choose “decimal” (the default), the portion of the price to the right of the decimal will be displayed in decimal format (e.g., 25.375, 45.25, etc.).

Notes on Units:

- When entering prices with Units set to a fraction (e.g., 1/16, 1/8, etc.), you can separate the integer from the fractional portion of the number with either a carat sign (^) or a single space (e.g., 24^3 or 24 3 = 24 3/8 if Units is set to 1/8).
- Full fractional numbers entered in a datasheet are automatically converted to the specified unit. For example, if Units is set to Decimal and you enter "*24 3/8*," The DownLoader will display 24.375. Likewise, if Units is set to 1/16 and you enter "*14 5/8*," The DownLoader will display "14 ^10."

Opening Prices/Open Interest. To track the Opening Prices or Open Interest, select these boxes. You will notice that a column is added to the data pane when you select either of these options.

If you mark this box for an existing datasheet, The DownLoader fills in the data pane with hypothetical opening prices derived from certain price relationships. The open is set to the previous day's closing price if it falls within today's high/low range. The open price is set to today's low if yesterday's close is less than today's low. The open price is set to today's high if yesterday's close is greater than today's high.

Open interest is available with most futures and option contracts.

Interval. This information is required for the security to update in real-time with intraday charting programs such as MetaStock Professional. This information is available only if you have selected Intraday for the periodicity.

You choose the interval when you create the security. The interval specifies how often to update real-time charts. For example, choosing "5" causes MetaStock Professional to update the security with 5-minute bars. Once the interval has been chosen for a security, it cannot be changed.

IMPORTANT: You ***cannot*** collect real-time data with The DownLoader.

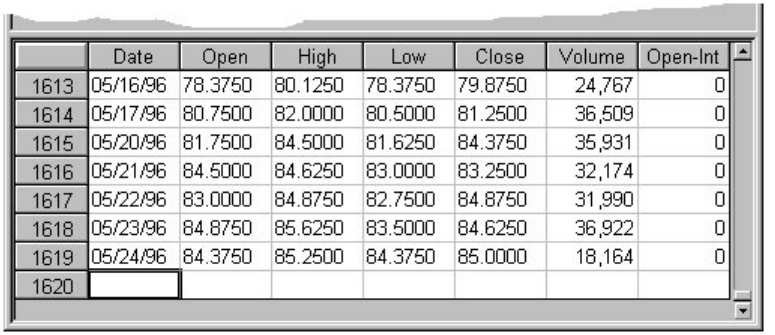
A 24-hour clock uses times from 0-23 hours, instead of 1-12. Thus 12:30 AM = 00:30, 3:00 PM = 15:00, and 11:00 PM = 23:00.

Start/End Times. This information is required for the security to update in real-time with intraday charting programs such as MetaStock Professional. This information is available only if you have selected **Intraday** for the periodicity.

Start and End times are required so that MetaStock Professional knows when to store data. They are normally set to correspond with the times the market opens and closes. Enter the Start and End times using a 24-hour clock from your local time zone.

Data Pane

The bottom section of a datasheet is called the data pane. This is where you view, edit, and enter the price data. A datasheet can hold up to 65,500 records (i.e., ticks, minutes, hours, days, weeks, etc.).



	Date	Open	High	Low	Close	Volume	Open-Int
1613	05/16/96	78.3750	80.1250	78.3750	79.8750	24,767	0
1614	05/17/96	80.7500	82.0000	80.5000	81.2500	36,509	0
1615	05/20/96	81.7500	84.5000	81.6250	84.3750	35,931	0
1616	05/21/96	84.5000	84.6250	83.0000	83.2500	32,174	0
1617	05/22/96	83.0000	84.8750	82.7500	84.8750	31,990	0
1618	05/23/96	84.8750	85.6250	83.5000	84.6250	36,922	0
1619	05/24/96	84.3750	85.2500	84.3750	85.0000	18,164	0
1620							

The data pane is similar to a spreadsheet. It is made up of individual cells in a two-dimensional matrix of columns and rows. Each column displays a date field (i.e., Date, Open, High, Low, Close, Volume, and Open Interest) and each row displays a single period's data.

You can scroll the data pane up and down using the vertical scroll bar on the right side of the data pane. You can scroll left and right in the data pane using the horizontal scroll bar at the bottom of the data pane. To quickly move to the first record in the data pane, you can press CTRL+HOME. To quickly advance to the last record in the data pane you can press CTRL+END.

Press CTRL+HOME to move to the first record. Press CTRL+END to advance to the last record.

When entering dates in the data pane, you can use either dashes or slashes as the separator. If dashes are used (e.g., 08-09-95), The DownLoader converts them to slashes automatically (e.g., 08/09/97). You can also use a convenient drop-down calendar to specify the date by pressing the F4 key while in the date field. See page 36 for more information.

When entering numbers in the data pane, you can use either decimal or fractions. If your “units” setting is different than the format you use to enter the value, The DownLoader will convert the number to the proper format. For example, if your units setting is decimal and fractions are used (e.g., 35 3/8), The DownLoader converts them to decimal automatically (e.g., 35.375).

Working in the Data Pane

When entering/editing information in the data pane of your datasheet, several important functions are available as follows.

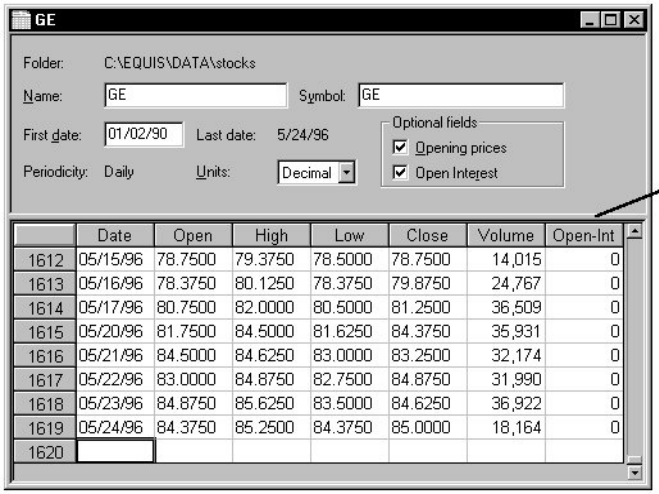
Adjusting Pane Height

You can adjust the height of the attribute and data pane within the datasheet by dragging the splitter bar that separates the two panes.

The mouse will look like:

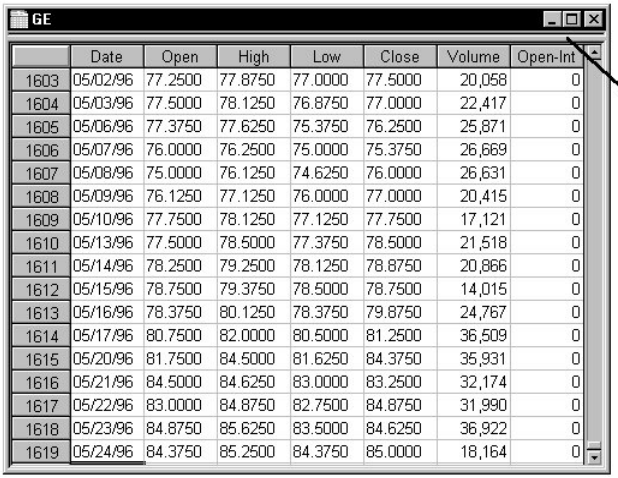
or

when it is on a splitter bar.



	Date	Open	High	Low	Close	Volume	Open-Int
1612	05/15/96	78.7500	79.3750	78.5000	78.7500	14,015	0
1613	05/16/96	78.3750	80.1250	78.3750	79.8750	24,767	0
1614	05/17/96	80.7500	82.0000	80.5000	81.2500	36,509	0
1615	05/20/96	81.7500	84.5000	81.6250	84.3750	35,931	0
1616	05/21/96	84.5000	84.6250	83.0000	83.2500	32,174	0
1617	05/22/96	83.0000	84.8750	82.7500	84.8750	31,990	0
1618	05/23/96	84.8750	85.6250	83.5000	84.6250	36,922	0
1619	05/24/96	84.3750	85.2500	84.3750	85.0000	18,164	0
1620							

For example, if you just want the data pane to be displayed, drag the splitter bar to the top of the datasheet.



	Date	Open	High	Low	Close	Volume	Open-Int
1603	05/02/96	77.2500	77.8750	77.0000	77.5000	20,058	0
1604	05/03/96	77.5000	78.1250	76.8750	77.0000	22,417	0
1605	05/06/96	77.3750	77.6250	75.3750	76.2500	25,871	0
1606	05/07/96	76.0000	76.2500	75.0000	75.3750	26,669	0
1607	05/08/96	75.0000	76.1250	74.6250	76.0000	26,631	0
1608	05/09/96	76.1250	77.1250	76.0000	77.0000	20,415	0
1609	05/10/96	77.7500	78.1250	77.1250	77.7500	17,121	0
1610	05/13/96	77.5000	78.5000	77.3750	78.5000	21,518	0
1611	05/14/96	78.2500	79.2500	78.1250	78.8750	20,866	0
1612	05/15/96	78.7500	79.3750	78.5000	78.7500	14,015	0
1613	05/16/96	78.3750	80.1250	78.3750	79.8750	24,767	0
1614	05/17/96	80.7500	82.0000	80.5000	81.2500	36,509	0
1615	05/20/96	81.7500	84.5000	81.6250	84.3750	35,931	0
1616	05/21/96	84.5000	84.6250	83.0000	83.2500	32,174	0
1617	05/22/96	83.0000	84.8750	82.7500	84.8750	31,990	0
1618	05/23/96	84.8750	85.6250	83.5000	84.6250	36,922	0
1619	05/24/96	84.3750	85.2500	84.3750	85.0000	18,164	0

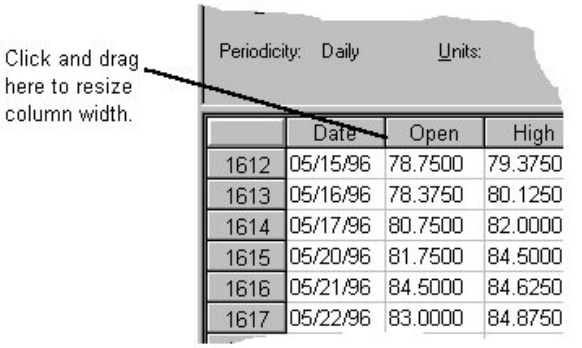
Adjusting Column Widths

You can adjust the width of a column by positioning the mouse on the vertical border between two column heading cells and then clicking and dragging with the mouse.

The mouse will look like:

or

when it is on a splitter bar.



	Date	Open	High
1612	05/15/96	78.7500	79.3750
1613	05/16/96	78.3750	80.1250
1614	05/17/96	80.7500	82.0000
1615	05/20/96	81.7500	84.5000
1616	05/21/96	84.5000	84.6250
1617	05/22/96	83.0000	84.8750

Selecting Data

You can select an individual cell by clicking on the cell. The cell will be outlined to indicate that it is selected. You can select a range of cells by clicking and dragging the mouse over the desired range. The entire range will be highlighted to indicate that it is selected.

You can quickly select (highlight) an entire row of price data by clicking on the row heading. Multiple rows can be selected by dragging the mouse pointer over the row headings.

You can quickly select the entire datasheet by clicking the blank heading cell at the top left corner of the data pane. Selected price data can then be deleted with the DEL key or cut/copied to the clipboard using the Edit commands (see page 687). If you right-click on the selected data, a shortcut menu will appear with the commands that can be performed on the selected data.

See the next section for information on moving and copying data between Datasheets.

Moving and Copying Data

Price data in the data pane of a datasheet can be moved or copied from one location to another within the same or to a different datasheet. Data is copied and moved using the cut/copy commands (see pages 687–688).

For information on creating new datasheets, see page 735.
For information on editing existing datasheets, see page 678.

To copy data from one datasheet to another

Data is selected by clicking and dragging the mouse over the desired range. The background color of the selected range will change.

You can also click on the row heading to select an entire row of data.

1. Open both datasheets using **File>** Open.
2. Select the datasheet you want to copy from by clicking on the datasheet or by selecting it from the **Window** menu (page 735).
3. Select the range of data you want to copy.
4. Select **Edit>** Copy (page 687).
5. Select the datasheet you want to copy to by clicking anywhere on the datasheet or by selecting it from the Window menu.
6. Click on the cell you want to copy the data to.
7. Select **Edit>** Paste (page 688).
   The contents of the cell(s) will be replaced with the new data.

To move data from one datasheet to another

1. Open both datasheets using **File>** Open.
2. Select the datasheet you want to move data from by clicking on the datasheet or by selecting it from the **Window** menu (page 735).
3. Select the range of data you want to move.
4. Select **Edit>** Cut (page 687). The selected range of data will be removed.
5. Select the datasheet you want to move the data to by clicking anywhere on the datasheet or by selecting it from the Window menu.
6. Click on the cell you want to move the data to.
7. Select **Edit>** Paste (page 688).
   The contents of the cell(s) will be replaced with the new data.

To copy or move data within the same datasheet

1. Open the datasheet using **File>** Open.
2. Select the range of data you want to copy or move.
3. Select **Edit>** Cut (page 687) if you want to move the data.
   Select **Edit>** Copy if you want to copy the data.
4. Click on the cell where you want to place the data.
5. Select **Edit>** Paste (see page 688).

To move data with drag and drop

You can always undo a change made to a data pane by selecting Edit> Undo.

1. Open the datasheet using **File>** Open.
2. Select the range of data you want to copy or move.
3. Position the mouse pointer over the border of the selected range.
4. Click and hold the left mouse button and drag the border to the desired location within the same datasheet.
5. Release the mouse button to drop the data in the new location.

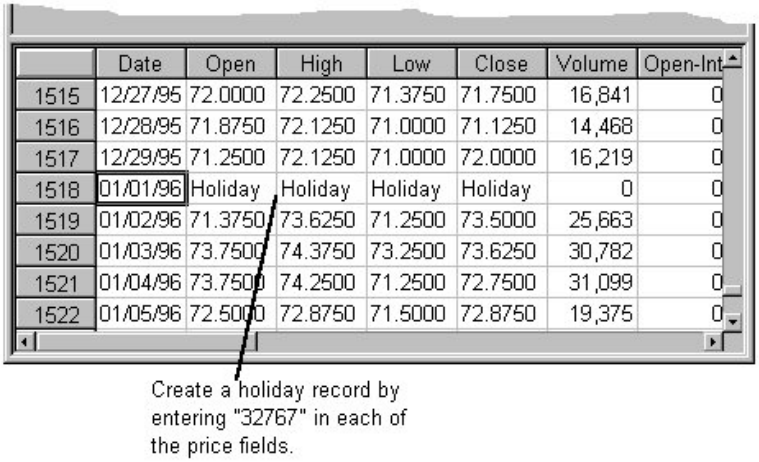
To copy a security to another folder

1. Select **Tools>** Copy.
2. Select the security(s) you want to copy.
3. Click **Copy**.
4. Type (or select) the folder you want to copy to.
5. Click **OK**.

Holiday Records

A holiday record is created by entering the value "*32767*" in each of the data fields (i.e., open, high, low, close, vol, and o/i) for those days on which a holiday falls. The DownLoader will display the word "Holiday" in each of the price fields when this special record is entered.

Note: Holiday records are strictly optional for Equis software. However, some software programs require the holiday record in order to accurately compute certain indicators.



	Date	Open	High	Low	Close	Volume	Open-Int
1515	12/27/95	72.0000	72.2500	71.3750	71.7500	16,841	0
1516	12/28/95	71.8750	72.1250	71.0000	71.1250	14,468	0
1517	12/29/95	71.2500	72.1250	71.0000	72.0000	16,219	0
1518	01/01/96	Holiday	Holiday	Holiday	Holiday	0	0
1519	01/02/96	71.3750	73.6250	71.2500	73.5000	25,663	0
1520	01/03/96	73.7500	74.3750	73.2500	73.6250	30,782	0
1521	01/04/96	73.7500	74.2500	71.2500	72.7500	31,099	0
1522	01/05/96	72.5000	72.8750	71.5000	72.8750	19,375	0

Create a holiday record by entering "32767" in each of the price fields.

Real-time Data

The DownLoader allows you to create and maintain intraday securities (i.e., those based on real-time data). Real-time charting software, like MetaStock Professional, is used to collect and analyze this intraday data. To prevent real-time data from flowing into an open intraday security file, The DownLoader locks the file (temporarily) before opening it. This allows you to view and edit the intraday data up to that point in time, while data continues to flow unimpeded into a temporary memory buffer.

On closing the datasheet, the buffered data (i.e., the data stored in memory while the file was locked) is automatically written to the

file. Opening the datasheet again will reveal the newly created records. If the datasheet remains open for an extended time and more than 1,000 intraday quotes are buffered, the datasheet is temporarily closed to allow the buffered data to be written to the file. Once, the data is written to the file, the datasheet is automatically reopened.

The DownLoader will notify the real-time charting program, MetaStock Professional, of any changes made to the data in an open chart. The chart will automatically reopen to reflect the changed data.

A 24-hour clock uses times from 0-23 hours, instead of 1-12. Thus 12:30 AM = 00:30, 3:00 PM = 15:00, and 11:00 PM = 23:00.

The **Time** column in the data pane of an intraday security displays time in the HHMMTTT format, where HH is hour of day (using a 24-hour clock), MM is the minutes (0 to 60) and TTT is the tick count (0 to 999).

Accessing Data from a CD-ROM

The DownLoader is able to read security files directly from a CD-ROM (or any read-only media). However, because a CD-ROM cannot be written to, certain features in The DownLoader are limited when working with data on a CD-ROM as described below.

If you need to edit the data on a CD-ROM, you can use the Copy command (see page 656) to copy the data to your hard disk, where it can be edited.

The controls in the top section of a datasheet (i.e., attribute pane) are disabled if the security file resides on a CD-ROM (or any read-only media). The price data in the bottom section of a datasheet (i.e., data pane) can be viewed, but cannot be edited in any way. For example, the Cut, Paste, Clear, Insert Row, and Delete Row options in the **Edit** menu are disabled to prevent you from editing the data. The label Read-Only appears in the heading of the datasheet to remind you that the security cannot be edited.

The options in the Adjust menu are disabled if the selected datasheet is labeled "Read-Only." Adjusting for distributions or splits requires that the security's data reside on write capable media (e.g., a hard disk drive).

Convert, Copy, Delete, Merge, and Sort

The Convert, Copy, Delete, Merge, and Sort commands in the **Tools** menu require that data be written to a disk. A warning message will appear if you attempt to use these features in a way that requires data to be altered on the CD-ROM. For example, the Destination folder during a convert or merge procedure cannot be located on a CD-ROM. If you choose a folder on a CD-ROM as your destination, a warning message will appear.

The DownLoader Menu Commands

File Menu

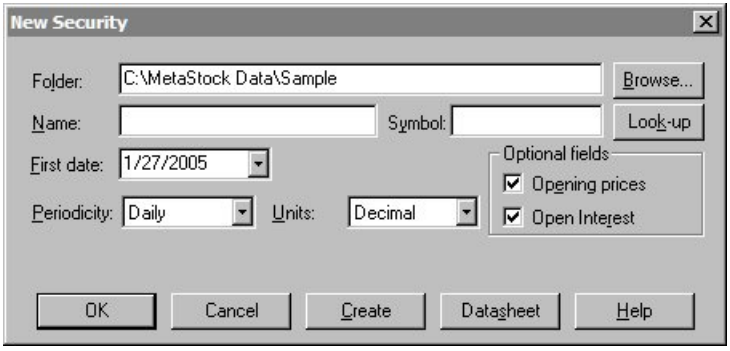
The commands in the **File** menu all center on the processing of new and existing security files. Security files are maintained within a special tool called a datasheet. Datasheets are used to create new securities, edit existing securities, and add, edit, and adjust price data.

New> Security

New button

*A **security** is any investment vehicle for which financial market transactions determine the price. These include stocks, bonds, options, mutual funds, and futures.*

The **New>** Security command is used to add new security files. Up to 6,000 securities (including composites) can be added in a single folder. However, you may want to organize your securities into multiple folders (by industry group, security type, etc.). The fewer securities you have in a folder, the better the performance of programs that access the data (e.g., MetaStock).



Folder. Type (or choose with Browse) the folder that will contain the new security file. See page 674 for information on creating new folders.

Name. Type the name of the security. If you use the Symbol Database (see page 667), the name and symbol will automatically be filled in. The Symbol Database (if left blank) automatically inserts the ticker symbol for the name.

Symbol. Type the ticker symbol for the security.

First Date. Enter the first date you want to collect data for. You will specify the Last Date to collect at the time of data collection.

Units. Choose the unit format in which you would like the price data to be displayed. For example, if you choose "1/8," the portion of the

price to the right of the decimal will be displayed in eighths. Only the numerator is shown—the denominator is dropped (e.g., 25 3/8 is displayed as 25 ^3). If you choose "decimal" (the default), the portion of the price to the right of the decimal will be displayed in decimal format (e.g., 25.375, 45.25, etc.).

Opening Prices/Open Interest. To track the Opening Prices or Open Interest, select these boxes. You will notice that a column is added to the data pane when you select either of these options. Open interest is available with most futures and option contracts.

Interval. This information is required for the security to update in real-time with intraday charting programs such as MetaStock Professional. This information is available only if you have selected Intraday for the periodicity.

Choose the interval from the drop-list. The interval specifies how often to update real-time charts. For example, choosing "5" causes MetaStock Professional to update the security with 5-minute bars. Once the interval has been chosen for a security, it cannot be changed.

IMPORTANT:
You ***cannot*** collect real-time data with The DownLoader.

Start/End Times. This information is required for the security to update in real-time with intraday charting programs such as MetaStock Professional. This information is available only if you have selected Intraday for the periodicity.

Start and End times are required so that MetaStock Professional knows when to store data. They are normally set to correspond with the times the market opens and closes. Enter the Start and End times using a 24-hour clock from your local time zone.

Browse. Click **Browse** (see page 666) to select the data folder where the new security will be added. The folder you select appears in the Folder edit box.

Look-up. Use **Look-up** to display the Symbol Database which is used to quickly fill in the Name and Symbol fields with the desired security. See page 667 for more information on using the Symbol Database.

Periodicity. Choose the desired periodicity for the security. Choose Intraday if you want to maintain intraday price data (e.g., tick, 5-minute, hourly, etc.). Choose Daily if you want to maintain price data for each day that the security trades. Choose Weekly if you want to maintain price data for the security on a weekly basis (Friday to Friday). Choose Monthly if you want to maintain price data for the security on a monthly basis (month-end to month-end).

Note: Once the periodicity is chosen for a security, it cannot be changed. You can only choose the periodicity for a security when it is first added.

Create button

Create. Click **Create** repeatedly to add multiple securities to a folder without leaving the dialog. When you're done, click **OK**.

Datasheet. Click **Datasheet** to display a spreadsheet-like form at the bottom of the dialog. This form is called the data pane (see page 656). The data pane can be used to add price data manually and to edit existing price data.

- See page 658 for information on how to select and resize columns.
- For more information on the other fields in the New Security dialog, see page 657.

To add a new security

1. Select **File>** New> Security.
2. Complete the attribute information requested by the New Security dialog.
3. If you plan on updating the security's price data automatically (see page 691), click **OK**.

To add price data manually

1. Select **File>** New> Security.
2. Complete the attribute information requested by the New Security dialog (see page 663).
3. Click **Datasheet** to display the datasheet.
4. Enter the price data in the data pane of the datasheet.
5. Close the datasheet when you have completed adding the data.

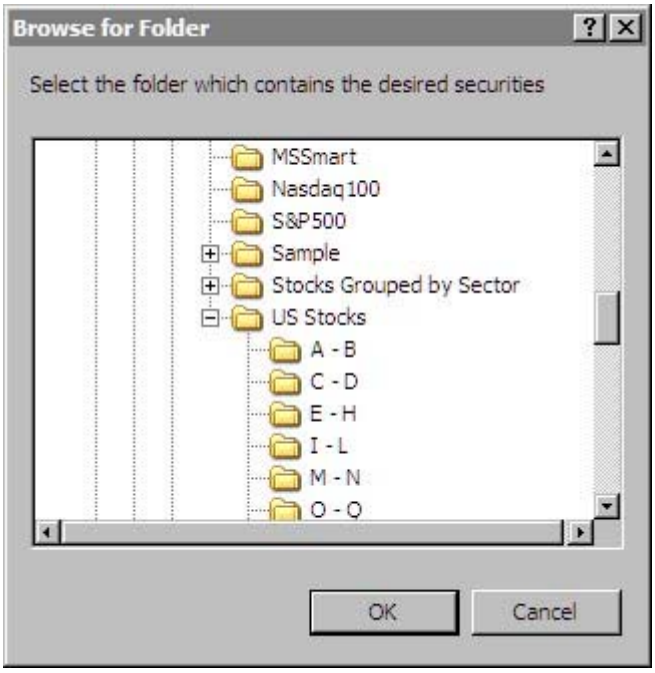
Notes

- See page 691 for information on adding price data to the file automatically using Reuters DataLink.
- See page 678 for information on editing existing files.

Browse for Folder Dialog

Browse button

The Browse for Folder dialog appears after clicking **Browse** . The Browse for Folder dialog is used to quickly select the folder displayed in a dialog's Folder box.



The Browse for Folder dialog contains a scrolling list of the folder structure of your disk.

To expand a folder so that its sub-folders are listed

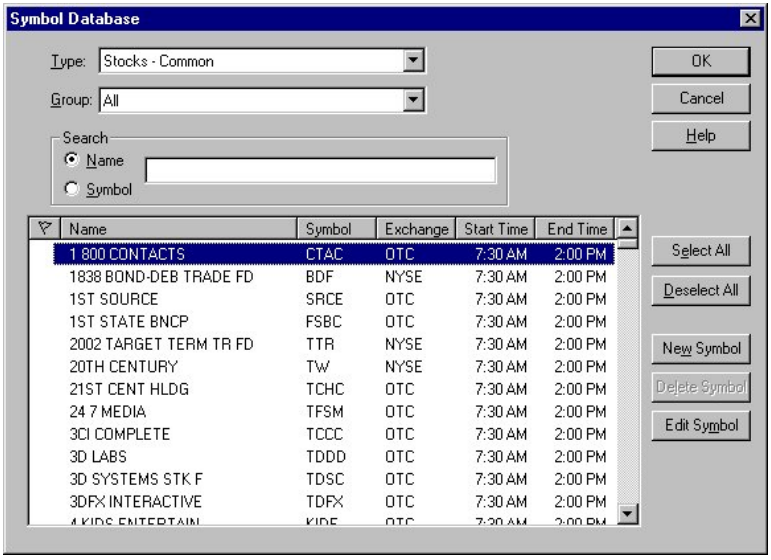
1. Double-click on the folder name.
2. Locate the desired subfolder.
3. Click **OK** to select the folder.
   The "Browse for Folder" dialog will disappear and the path to the selected folder will appear in the dialog's Folder box.

Symbol Database

The Symbol Database provides you with instant access to ticker symbol information on over 20,000 stocks and about 10,000 mutual funds, for all major US exchanges. In addition, futures, indices (both U.S. and international), market indicators, and Canadian stocks that are symbol-compatible with Reuters DataLink data services are available. This dialog is used to place the name and ticker symbol of the selected security in the New Security dialog.

The Symbol Database can be used to quickly create multiple security files for the securities you select. The number of securities selected (i.e., highlighted) in the Symbol Database is displayed on the status bar at the bottom of the application window.

The most up-to-date symbol file (Example name:`symboldatabase90.dta`) is on the Equis web site at www.equis.com in the Files section of the Customer Support area. To update this file automatically, select **Tools**> Update Symbol Database. This file is updated monthly.



Type. Use the Type drop list to choose the type of security to list (i.e., stocks, futures, etc.).

Group. Use this drop-list to control which securities are listed in the dialog. The contents of the drop-list are dependent on your selection in the Type box.

If you are searching for a specific security and you're not sure which exchange grouping the security belongs to, you should select the "All" group to list all securities.

You can also choose from several specialized groups (i.e., S&P 100 stocks, NYSE stocks, etc.). The group called “optionable stocks” lists all stocks on which options are traded.

Search. Use this box to search for the specified name or symbol.

Select All. Click this to quickly select all securities listed.

Deselect All. Click this to quickly deselect all securities.

New Symbol. Click this to add a new symbol to the database.

Delete Symbol. Click this to delete the selected symbol from the database.

Note: This button is enabled only when a symbol is selected that was added to the database using the “New Symbol” command.

Edit Symbol. Click this to edit the properties of the selected symbol.

Note: If you select any of the “Sector-XXXXX” options (Sector-Metals, Sector-Conglomerates, etc.) in the Type field, the Edit Symbol, Delete Symbol, and New Symbol controls are disabled, as you cannot modify these lists.

Creating Multiple Securities with the Symbol Database

Instead of you having to enter each security file individually, the Symbol Database dialog allows you to search for and select multiple files to create at once. You can even create special groupings of stocks, such as the Dow 30 stocks, S&P 100 stocks, all optionable stocks, etc.

To create multiple securities using the Symbol Database

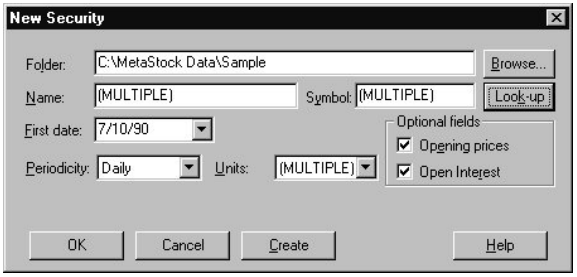
1. Select **File>** New> Security.
2. Click **Look-up**. The Symbol Database dialog appears.
3. Choose the Type and Group to specify the securities listed.

   Note: You can restrict the list and select individual securities by typing specific names or symbols in the Search box. Simply separate them with a caret (^) (e.g.*MSFT^IBM^AAPL^NSCP*).
   You can also separate the names or symbols with a comma to find everything beginning with a certain letter (e.g. A,B,C will show every security beginning with the letters A, B, and C).

4. Click **Select All** to quickly select all securities generated by the search. To select a continuous group of securities, click on the first item, then hold down the SHIFT key as you click on the last item. All items between the first and last items will be selected.

To select multiple individual securities, hold down the CTRL key as you click on each one.

5. Click **OK**. The New Security dialog will appear with the text (MULTIPLE) in the Name, Symbol, and Units fields. The Start and End times will be blank.



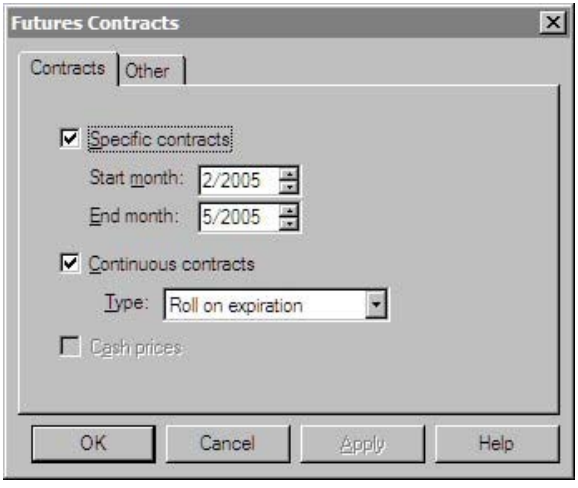
6. Verify that the remaining attributes in the New Security dialog are set correctly.
7. Click **OK** in the New Security dialog to create the selected securities.

Creating Futures Contracts with the Symbol Database

If you use the Reuters DataLink data services to collect your end-of-day data, you can use the Symbol Database dialog to create indices and futures (in addition to stocks and mutual funds).

If you select a Futures symbol from the Symbol Database dialog, the Futures Contracts dialog is displayed. You use this dialog to specify which contracts to create.

Use the Contracts page to control the type and date range for the contracts.



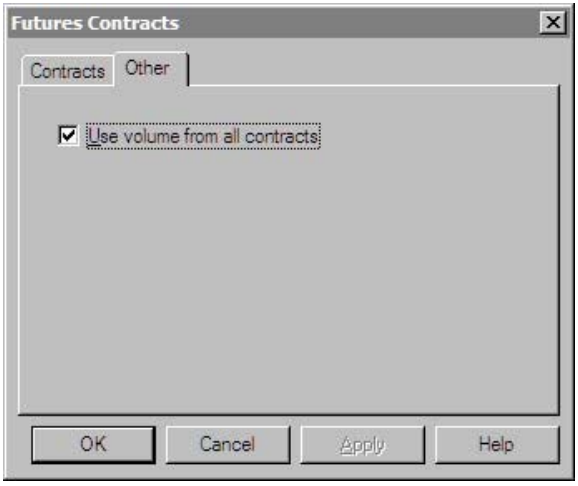
Specific contracts. Mark this box to create all contracts for the selected futures between the specified start month and end month. If you only need to create the contracts for one month, then specify the same month for the start and end months.

Continuous contracts. Mark this box to create a continuous contract for all the selected futures contracts. A continuous contract is a special contract that automatically rolls to the next contract when the current contract expires, thereby making it "continuous."

Type. Currently the only supported type of contract is “Roll on Expiration”.

Cash prices (eSignal only). Mark this box to create cash/spot symbols for all the selected futures.

Use the Other page to control the future contract volume option.



Use volume from all contracts. Mark this box if you want the volume for all contracts to be stored. Even if you choose a specific contract month, marking this box will cause the volume to reflect the total volume for all contract months.

Updating the Symbol Database

The list of symbols is updated monthly and can automatically be updated by selecting **Tools>** Update Symbol Database in either MetaStock or The DownLoader.

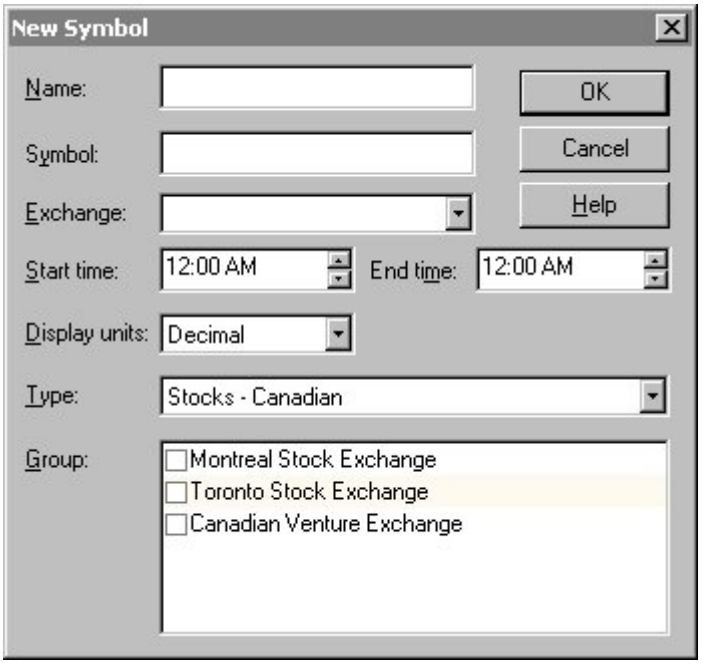
The list of symbols and other commonly requested .sym files are also available on the Equis International web site at *http://www.equis.com* in the **Customer Support** area.

Modifying the Symbol Database

The symbols and information included in the Symbol Database can be adjusted.

- To edit information for a specific symbol, select the symbol, and then click **Edit Symbol** in the Symbol Database dialog.
- To delete a symbol, select the symbol, and then click **Delete Symbol** in the Symbol Database dialog.
- To add a symbol, click **New Symbol** in the Symbol Database dialog.

The New Symbol Dialog



Name. Enter the name of the new symbol.

Symbol. Enter the ticker symbol of the new symbol.

Exchange. Enter the exchange code or choose from the drop-list.

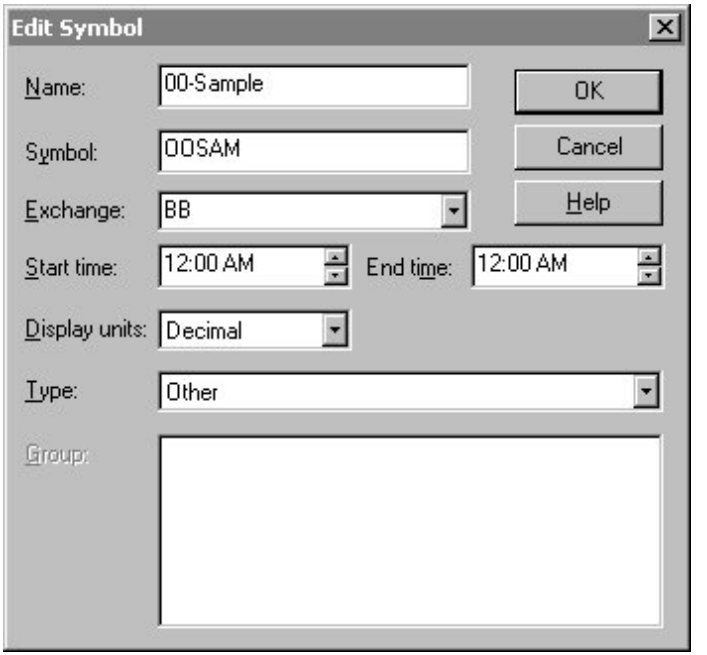
Start time/End time. Specify the time to begin and end collecting intraday data.

Display units. Choose the unit format in which you would like the price data to be displayed.

Type. Choose the type of symbol you are creating from the drop-list.

Group. If groups are available for the Type you have selected, you may choose a group(s) from the list provided by marking the appropriate box(es).

The Edit Symbol Dialog



Name. Edit the name of the symbol.

Symbol. Edit the ticker symbol.

Exchange. Edit the exchange code or choose from the drop-list.

Start time/End time. Modify the time to begin and end collecting intraday data.

Display units. Choose the new unit format in which you would like the price data to be displayed.

Type. Choose a new type from the drop-list.

Group. If groups are available for the Type you have selected, you may choose a group(s) from the list provided by marking the appropriate box or boxes.

Creating Custom Symbol Lists for the Symbol Database

The Symbol Database includes nearly all U.S. and Canadian stocks and mutual funds. However, if you follow securities that do not have a universally accepted symbol format, like futures, indices, or international securities, the symbols you need may not be included in the Symbol Database. To accommodate these types of symbols, you can create your own groups of symbols for use inside the Symbol Database dialog by creating an ASCII file with a "SYM" extension.

The Symbol Database may also be used to enter and customize large groups of securities. You may find this helpful for posting recommended lists of securities to clients or colleagues, keeping lists of securities in separate portfolios, creating custom industry groups, etc.

To create your own groups in the Symbol Database

1. Open a new ASCII file in a text editor (e.g. WordPad, Notepad).
2. Type the list of securities to add to the Symbol Database using the following format:
   `<security name>,<symbol>,<exchange>`

Example:

```
Microsoft,MSFT,NASD
Apple Computer,AAPL,NASD
Oracle,ORCL,NASD
Iomega,IOM,NYSE
```

IMPORTANT: If the security name contains a comma (i.e. My Business, Inc.), the name must be surrounded by quotes (i.e. “My Business, Inc.”). There should be no spaces before or after commas. Each individual security must be entered on a separate line in the text editor. The `<exchange>` and `<security name>` entries are completely optional.

---

3. Save the file with the extension ".SYM" (i.e. "Computer.sym"). If your text editor adds the ".TXT" extension (i.e. “Computer.sym.txt”), you will need to rename the file in Windows Explorer to remove the “.TXT” extension so the Symbol Database correctly recognizes the file format.
4. Place the symbol file in the same folder as the symbol database file (i.e. `C:\Program Files\Equis\`The DownLoader).
5. Open The DownLoader and display the Symbol Database. The name of the newly created Symbol Database file will be displayed in the Type menu of the Symbol Database.

Using an ASCII file

You may also create an ASCII file using the following format:

```
<symbol>
```

Example:

```
MSFT
AAPL
ORCL
IOM
```

In the example above, the ASCII file contains only **one** field per line (i.e., the symbol).

Since the `<security name>` is not provided, The DownLoader will try to provide a <security name> from the existing Symbol Database.

For example, since the Symbol Database in The DownLoader associates the symbol "MSFT" to the security name "Microsoft," the name "Microsoft" will automatically be used in the <security name> field. However, if The DownLoader does not find a match for the <symbol> in the existing list, the symbol itself will be used in place of the <security name>.

Including start and end times

To create a list of intraday securities, including start and end times, use the following format:

```
<security name>,<symbol>,<exchange>,
<start time>,<end time>
```

The start and end times must be in (HHMM) format, using a 24-hour clock. The `<exchange>` field must be included if you are including start and end times. If the exchange is unknown, you may enter "*N/A*" in the <exchange> field.

Example:

```
Microsoft,MSFT,NASD,0730,1530
```

You may use the time separator specified in the Regional Settings found in your Windows Control Panel (e.g., 07:30), but it is not necessary.

Creating Data Folders

MetaStock security files are ideally stored on your hard disk in separate folders. Although these folders can be anywhere on your hard disk, it is best to organize your security files logically by keeping them grouped in subfolders beneath one common folder (e.g.,`c:\MetaStock Data\...`). For example, the \MetaStock `Data\Sample` folder contains the sample data files that

were shipped with MetaStock. It is likely that you will want to create your own folders with unique names in which to store your securities.

For example, you may want to segregate your security files by keeping your commodities in one folder, your mutual funds in another, your stocks in another, and so forth (e.g.,`c:\MetaStock Data\commodities`, `c:\MetaStock Data\stocks`, `c:\MetaStock Data\funds`, etc.). You may want to divide your stocks even further into specific industries (e.g.,`c:\MetaStock Data\stocks\energy`, `c:\MetaStock Data\stocks\retail`, etc.).

To create folders for your security files

1. Select **File>** New> Security.
2. Type the name of the new folder to create in the Folder box (e.g.,`c:\MetaStock Data\stocks`).
3. Fill out the remaining information in the New Security dialog.

   Note: You must also add a security at this time so that the folder will have a reason for being created.
4. Click **OK**.
5. Click **Yes** when asked if you want to create the folder.

New> Composite

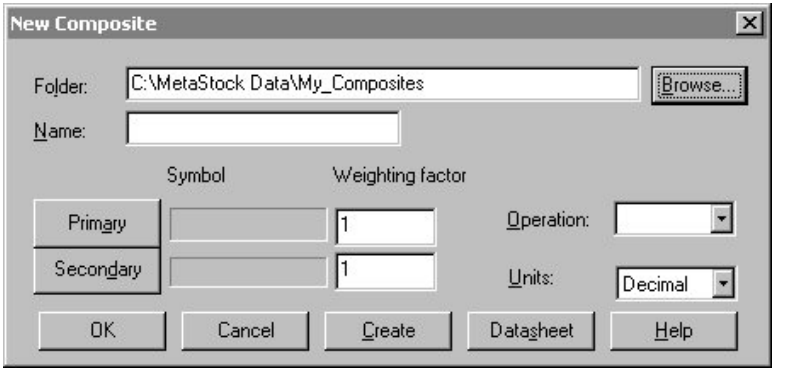
New button

The New Composite command is used to add new Composite files.

A composite is a special security type that links two different securities (primary and secondary) together with a mathematical operator. Composites are especially useful for displaying the relative strength of two different securities and for creating option and futures spreads.

Note: The appearance of a datasheet depends on whether you are working with a composite or a regular security.

When New Composite is selected, the datasheet allows you to specify the components of the composite.



Folder. Type the data folder drive/path or click **Browse** (see page 666) to select the data folder where the primary and secondary securities are located. The primary and secondary securities must be in the same folder.

Browse. Click **Browse** (see page 666) to select the data folder displayed in the Folder box.

Name. Type the name of the composite. Since a composite often involves two separate securities, you may want to give it a name that identifies the two securities used (e.g., IBM/Microsoft).

Symbol. Click the **Primary** and **Secondary** buttons to select the desired securities from a list. The ticker symbol of the selected security will be placed in the box. The Primary and Secondary securities you select must have the same periodicity and interval.

Weighting Factor. Use the Primary and Secondary weighting factor boxes to specify the weighting factor for each security. The weighting factor controls the "weighting" that a security in a composite receives. For example, if each security receives equal weight, enter "1.00" for both. If the primary security receives 70% weighting and the secondary 30%, then enter "0.70" in the primary security's weighting factor box and "0.30" in the secondary security's weighting factor box. Entering "0.70" causes The DownLoader to multiply the price of the primary security by 0.70 (i.e., 70%) before calculating the composite. Unless you are creating some type of unique commodity spread, you'll probably just want to leave the weighting factor set to the default value of 1.00.

Operation. Choose the mathematical operation you want to use for the composite. For example, if you choose Subtract, The DownLoader will subtract the secondary security from the primary security.

Create button

Create. Click **Create** repeatedly to add multiple composites to a folder without leaving the dialog. When you're done, click **OK**.

Datasheet. Click **Datasheet** to view the price data in a spreadsheet-like form at the bottom of the dialog. Each of the price fields are displayed in the column headings. Each row displays one period's data. See page 658 for information on how to select and resize columns.

Since a composite is a link between two securities, the price data in the data pane can only be viewed--it cannot be manually edited.

Units. Choose the unit format in which you would like the price data to be displayed. For example, if you choose 1/8, the portion of the price to the right of the decimal will be displayed in eighths. Only the numerator is shown--the denominator is dropped (e.g., 25 3/8 is displayed as 25 ^3). If you choose decimal (the default), the portion of the price to the right of the decimal will be displayed in decimal format (e.g., 25.375, 45.25, etc.).

To create a new Composite

1. Select **File>** New> Composite. The New Composite dialog appears.
2. Click **Browse** to select the folder where the two securities to be made into a composite are located.
3. Type a name for the composite in the Name edit box (e.g., IBM/Dow, Corn/Live Hogs).
4. Select the primary and secondary securities that constitute the composite by clicking the **Primary** and **Secondary** buttons.
5. Specify a weighting factor for each of the securities in the primary and secondary Weighting Factor boxes. Unless you are creating some type of unique commodity spread, you'll probably just want to leave the weighting factor set to the default value of 1.00.
6. Select the operation that links the two securities from the Operation drop-list box. Spreads use Subtract and relative strength comparisons use Divide.
7. Click **OK** to add the Composite.

Note: See page 679 for additional information on editing existing composites.

Open

Open button

Use the Open command to display the Open dialog. The Open dialog is used to open an existing security or composite datasheet. Up to six datasheets can be opened simultaneously for editing and/or viewing.

Datasheets are moved and resized like any standard window by using the mouse or the commands in the **Window** menu (see page 735). For more information on datasheets, see page 657.

Note: The appearance and function of a datasheet differs according to whether you are working with a composite or a security.

Opening a Security

When using the Open dialog to open a security's datasheet, note that you can click **Details** to display the ticker symbol, date range and other information about the securities. If you cannot locate the security you want to open, click **Find** (see page 680).

When a security is selected, a datasheet appears from which you can edit and/or view the security's attributes and price data. The periodicity and interval for an existing security cannot be changed. See page 657 for an explanation of security datasheet information.

To edit a security's datasheet

1. Select **File>** Open.
2. Double-click on the name of the security you want to edit.
3. Make the desired changes to the attribute pane in the datasheet.

   Note: You cannot change the periodicity or interval of an existing security. If you need to change the periodicity or interval, you must add a new security (see page 663) with the new periodicity or interval.

4. Make the desired changes to the data pane of the datasheet. Select the cell you want to edit by clicking the mouse on the

cell. The data in the cell will be outlined. Type the desired changes.

5. Once you are satisfied with the changes to the datasheet, select **File>** Save to save the changes.

To manually add price data

1. Select **File>** Open.
2. Double-click on the name of the security you want to manually update.
3. The DownLoader automatically inserts a new row at the bottom of the data pane for the next period's data.
4. Type the date and price data (e.g., high, low, close, etc.) for the new record.

   The DownLoader automatically inserts a date (incremented from the previous date) as soon as you begin typing in a price cell (i.e., high, low, close, etc.). The date is incremented based on the security's periodicity and the previous record. Holidays and weekends are not accounted for, so you will need to make sure the date is correct.

   If you want to continue adding new records, press the TAB key after typing the value for the last cell. Another row will automatically be inserted.
5. Once you are satisfied with the changes to the datasheet, select **File>** Save to save the changes.

   Note: If you are updating price data for multiple securities, use the "Change Security" buttons on the toolbar to quickly advance to the next security. The datasheet for the next security appears, ready for data input with a new row automatically inserted.

Change Security buttons

To insert new rows (records) in a datasheet

1. Select **File>** Open.
2. Double-click on the name of the security you want to edit.
3. Click on the row in the data pane where you want to insert a new record.

   For example, if you want to insert a record for 2/2/97 between records 2/1/97 and 2/3/97, click on the row for 2/3/97.
4. Select **Edit>** Insert Row.

   A row will appear above the current row. There will be zeros in each cell.

Opening a Composite

If a composite is selected, a datasheet appears from which you can edit and/or view the composite's attributes. The primary and secondary securities from the composite cannot be edited.

Since a composite is just a link between two securities, no actual data is associated with it. Therefore, the data you see in a composite datasheet cannot be edited. However, some of the attributes can be edited. Changes to the price data can only be made within either of the securities that make up the composite.

See page 675 for more information on the composite datasheet.

To edit a composite's attributes

1. Select **File>** Open.
2. Double-click on the name of the composite you want to edit.
3. Make the desired changes to the attribute pane of the datasheet. Note that you cannot change the primary and secondary securities that make up the composite.

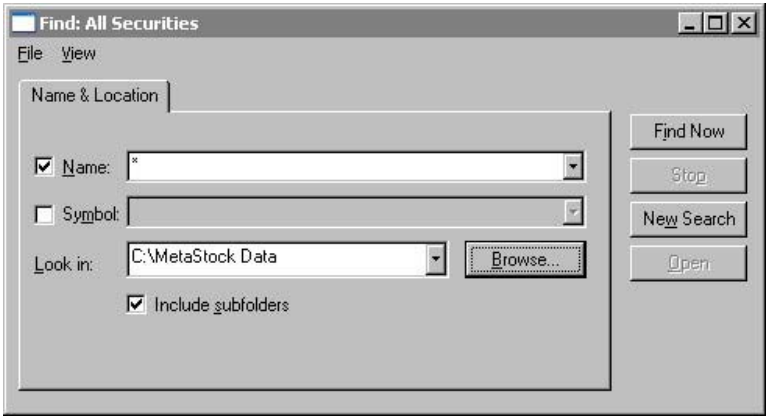
To change the securities in a composite

Since you cannot directly change the securities that make up a composite once it has been created, you must first delete the existing composite, and then add a new one with the desired securities.

1. Select **Tools>** Delete> Securities.
2. Select the composite you want to delete and click **OK**.
3. Add a new composite with the securities you want (see page 675).

Finding Securities

The Find command lets you search your disk for securities by name and/or symbol. The results of the search are displayed at the bottom of the dialog. This command is available directly from the Open dialog by clicking **Find**.



Name. Mark this box to search for the name of security to find. Use the drop-list to select from previously entered names.

Symbol. Mark this box to search for the symbol of the security to find. Use the drop-list to select from previously entered symbols.

Look in. Enter (or select with Browse) the folder to search.

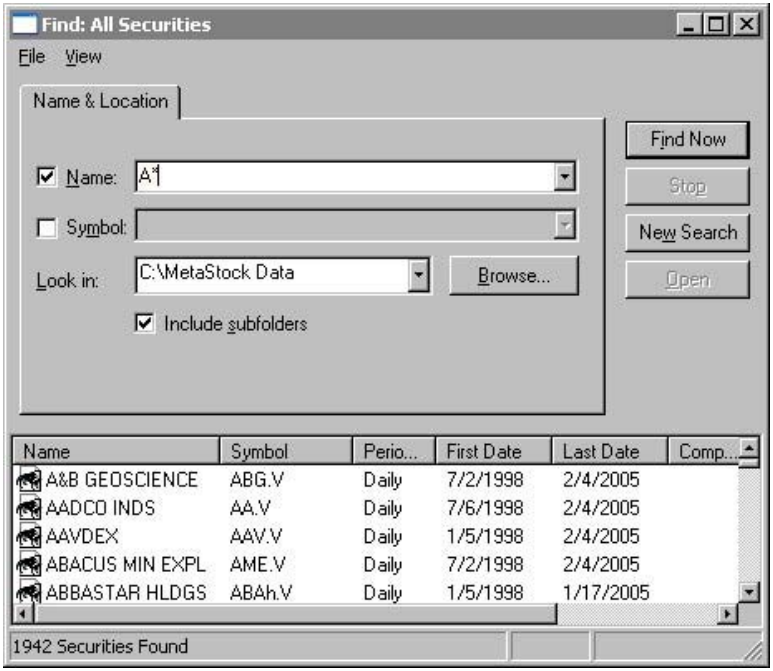
Include subfolders. Mark this box if you want the search to include subfolders for the folder specified in the Look in box.

Find Now. Click this button to start the search.

Stop. Click this button to stop a search in progress.

New Search. Click this button to clear the current search and specify a new one.

Open. Click this button to open a datasheet for the selected security found by the search. If the specified securities are found, the dialog will expand and list the securities.

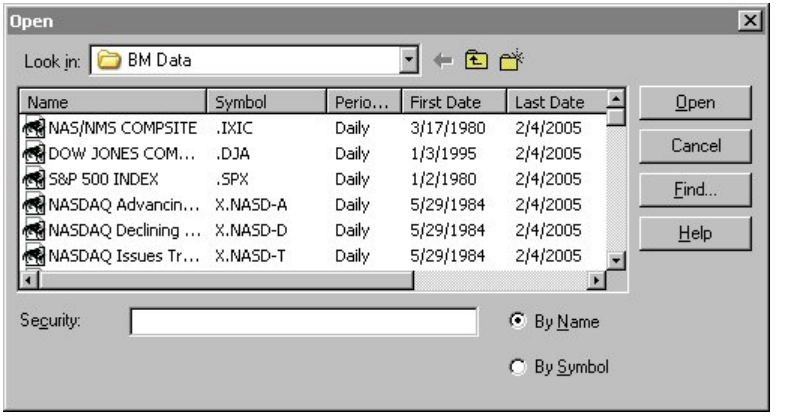


Notes

- You can right-click on the listed securities to change the way the files are displayed (i.e., by name, by symbol, small icons, large icons, detail or list).
- You can sort the listed securities by clicking on the column headings.

Special Controls in the Open Dialog

The Open dialog is very versatile. From this dialog you can control the information listed with the securities, rename securities, and sort securities.



List and Details Buttons

The List and Details buttons at the top of the dialog allow you to control the amount of information displayed in the list.

List button

Click the “List” button to display just the security's name or ticker symbols.

Details button

Click the “Details” button to display name, periodicity, date ranges, etc.

If the dialog is in Detail mode, you can sort the files by clicking on the column headings. Click on the column which you want the files to be sorted. Click on the heading a second time to return to the default sort order.

You can also resize the width of the columns by dragging the column heading separators.

Up One Level button

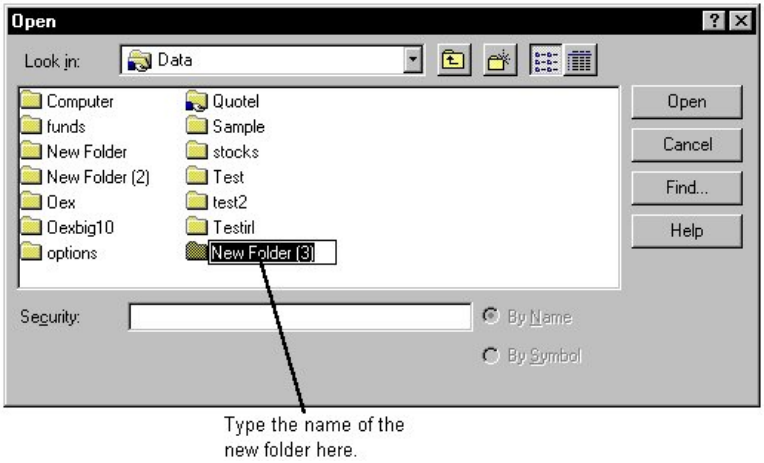
The “Up One Level” button allows you to move to the folder that is up one level from the current folder. The “Create New Folder” button allows you to create a new folder in the current folder. This button is disabled if the current folder contains MetaStock data files.

Create New Folder Button

Create New Folder button

You can create new folders from the Open dialog by clicking the “Create New Folder” button at the top of the dialog. Note that this button is disabled if the current folder is a MetaStock data folder.

This is to prevent you from creating nested data folders (i.e., a MetaStock data folder within a MetaStock data folder).



Close

Use the Close command to save and close datasheets. After you have finished working with a datasheet, it is recommended that you close it to free memory.

To close a datasheet

1. Select the datasheet you want to close by clicking anywhere within the datasheet or by selecting it from the Window menu (page 735).
2. Select **File>** Close. You will be asked if you want to save any changes.

   Note: You can also close a datasheet by double-clicking the system box at the top left corner of the datasheet. You will be asked if you want to save any changes before the datasheet closes.

Close All

Use the Close All command to quickly save and close all open datasheets.

To close all datasheets

Select **File>** Close All. You will be asked if you want to save each of the datasheets that have been changed.

Save

Save button

Use the Save command to save a datasheet. If you attempt to close a datasheet that you have made changes to, The DownLoader will automatically ask if you want to save it. Use the Save command frequently when you are making extensive changes to a datasheet. This will prevent you from losing data from power outages or other unplanned events.

To save a datasheet

1. Select the datasheet you want to save by clicking anywhere within the datasheet or by selecting it from the **Window** menu.
2. Select **File>** Save.

Save All

Use the Save All command to quickly save all security and composite datasheets displayed.

To save all datasheets

1. Select **File>** Save All.
2. The DownLoader will then save all open datasheets.

Change Security

The Change Security commands are used to quickly switch from one security to another in the current data folder. The DownLoader switches securities by replacing the security in the active datasheet with a different security.

You can also use the Change Security buttons on the toolbar or a scrollable pointing device (refer to page 35 for details).

Previous Security button

If you have a datasheet open, the Previous Security button on the toolbar displays the previous security and the Next Security button displays the next security in the current data folder.

Next Security button

The Change Security commands are ideal for quickly inspecting the data in each of your security files.

For example, to inspect the data in each of your security files, you could open the first security listed in the Open Security dialog and inspect the data. To inspect the data in the next security listed in the Open Security dialog, you can click the “Next Security” button on the toolbar. You could continue clicking the Next Security button to advance through all of the securities in that folder.

Page Setup

To control printing functions such as paper size, margins, headers/footers, orientation, etc., the Page Setup command in the **File** menu is used. Maybe you'd like your company name to appear at the top of every printed page and the date and time at the bottom. Or perhaps you'd like a larger margin. All this and more can be controlled within the Page Setup dialog.

See “Customizing the Printout with Page Setup” on page 154 for more information on Page Setup.

Print Preview

To see how data will appear when printed, use the Print Preview command in the File menu. Print Preview will show you an exact replica of the printout on your computer screen.

Print button

To preview a datasheet before printing

1. Select the datasheet you want to preview by clicking anywhere on the datasheet.
2. Select **File>** Print Preview.

Print

Print button

The Print command in The DownLoader is used to print security names and prices. The data is printed to the selected printer.

IMPORTANT: The printer must be set up correctly for the print command to function.

See “Printing Charts and Data” on page 159 for more information on printing.

To print all the price data in a datasheet

1. Select the datasheet that you want to print.
2. Select **File>** Print.
3. Choose Security Prices from the Print what drop list.
4. Click **All**.
5. Click **OK**.

To print a range of data in a datasheet

1. Select the datasheet that you want to print.
2. Select **File>** Print.
3. Choose Security Prices from the Print what drop list.
4. Click **Dates**.
5. Type, or choose from the drop-down calendar, the date range in the From/To boxes.

6. Click **OK**, or
   Select the desired range of data in the datasheet (see page 658).
7. Select **File>** Print.
8. Choose Security Prices from the Print what drop list.
9. Click **Selection**.
10. Click **OK**.

To print security names

1. Select **File>** Print.
2. Choose Security Names from the Print what drop list.
3. Click **OK**.

Recent Files List

The four most recently closed datasheets are displayed at the bottom of the **File** menu. To open one of the datasheets, you have multiple options:

- Click on one with the mouse
- Select one and press ENTER,
  or
- Type the number (with the **File** menu displayed) of the datasheet you want to open.

Exit

Use the Exit command (select **File>** Exit) to exit The DownLoader.

If you have any open datasheets that you have made changes to, you will be asked if you want to save them.

Edit Menu

The Windows clipboard is a temporary holding location where text and graphics can be stored.

Included in the **Edit** menu are the basic Windows clipboard commands (i.e., cut, copy, and paste) used to move and copy graphics and data from one location to another. Also included are commands used to find dates and to insert/delete rows. This menu is only available when a datasheet is open. Most of the Edit menu commands are also available by right-clicking (see page 20) on the object you want to change. See your *Windows User's Manual* for additional information about using the Cut/Copy/Paste commands and the Windows clipboard.

Undo

Undo button

Use the **Undo** command to cancel your most recent (up to 25) commands or actions. The Undo command is useful if you've deleted data by accident or don't like the results of your last action. Use the Undo command to return to the condition prior to the last action.

While editing the contents of a cell in a datasheet, the Undo command is temporarily disabled. If nothing is available to “undo,” the command changes to “Can’t Undo.”

Redo

Redo button

Use the **Redo** command to cancel the results of the most recent (up to 25) Undo command. The Redo command restores the document to its state just prior to use of the Undo command.

While editing the contents of a cell in a datasheet, the Redo command is temporarily disabled. If nothing is available to “redo” the command changes to “Can’t Redo.”

Cut

Cut button

Use the **Cut** command to move the selected data to the Windows clipboard. You can then transfer the clipboard information to another Windows application (such as a word processing document or spreadsheet) using the Paste command.

For more information on moving data using the Cut command, see page 11.

Copy

Copy button

Use the **Copy** command to copy the selected data to the Windows clipboard. You can then transfer the clipboard information to another Windows application (such as a word processing document or spreadsheet) using the Paste command.

For more information on the Copy command, see page 11.

Paste

Paste button

Use the **Paste** command to transfer the information in the Windows clipboard to the insertion point of the current window. For more information on the Paste command see page 11.

See your *Windows User's Manual* for more information about the Paste command and the Windows clipboard.

Clear

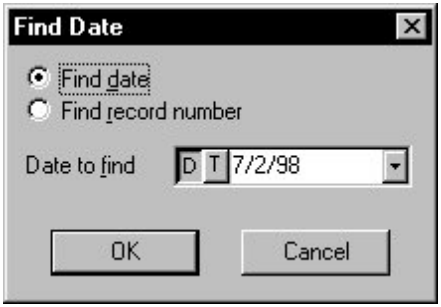
Use the **Clear** command to clear the price data in the selected rows of the datasheet and leave the dates intact. Dates cannot be cleared; they must be manually edited or removed using the Delete Row command.

To clear rows from a datasheet

1. Select the rows you wish to clear.
   Rows are selected by dragging the mouse pointer over the row headings.
2. Select **Edit>** Clear.

Find Date

Use the **Find Date** command to find a specific date, time, or record number in the current datasheet. When the date, time, or record number is found, the corresponding cell in the datasheet will be outlined.



To find a date

- Select “Find date” and enter the date or time to search for in the Date to find box.

To find a record number

- Select “Find record number” and enter record number to search for in the Record to find box.

Insert Row

Use the Insert Row command to insert a blank row in a datasheet. The row is inserted at the currently selected row. For example, to insert a blank row between the dates 2/1/97 and 2/3/97 so that you can enter the data for 2/2/97, click on the row for 2/3/97 and select **Edit>** Insert Row.

You can also insert multiple rows by selecting a range of rows and then using the Insert Row command. The number of rows inserted equals the number of rows selected.

To insert a blank row

1. Click on the row just below where you want the new row inserted.
2. Select **Edit>** Insert Row.

To insert multiple blank rows

Multiple rows can be selected by clicking and dragging the mouse.

1. Select the range of rows just below where you want the new rows inserted.
2. Select **Edit>** Insert Row.

Delete Row

Use the Delete Row command to delete the currently-selected row in a datasheet. For example, to delete the data for 2/10/99, click on the row for 2/10/99 and select **Edit>** Delete Row.

To delete a row

3. Click on the row you want deleted.
4. Select **Edit>** Delete Row.

To delete multiple rows

Multiple rows can be selected by clicking and dragging the mouse.

1. Select the range of rows you want deleted.
2. Select **Edit>** Delete Row.

View Menu

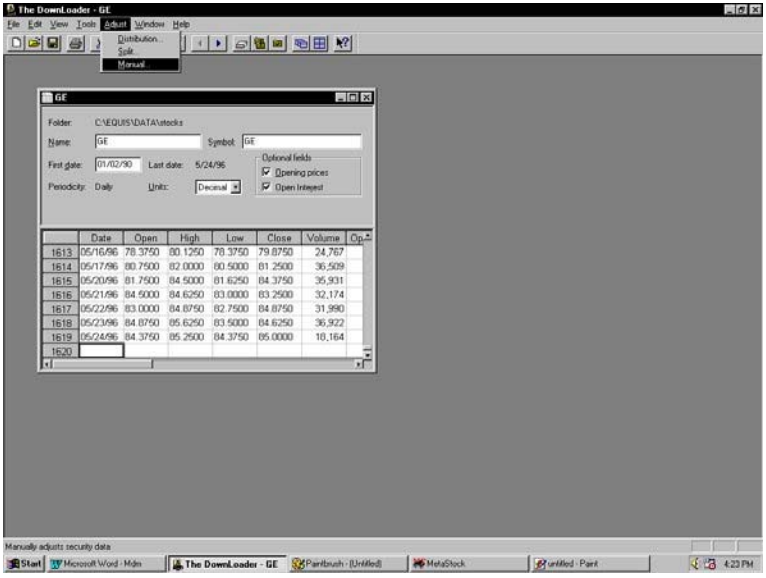
The commands in the **View** menu toggle the Toolbar and Status Bar on and off.

Toolbar

The toolbar is found below the menu bar at the top of the screen. Each of the buttons on the toolbar represents a commonly used command in The DownLoader. See page 23 for detailed information on using toolbars.

Status Bar

The Status Bar is found at the bottom of The DownLoader application window. It provides a description of the currently selected menu command.



To display the Status Bar

- Select **View>** Status Bar so that a check mark appears.

To remove the Status Bar

- Select **View>** Status Bar so that the check mark disappears.

Last Collection Report

The Last Collection Report command displays the Collection Report from the last downloading session. See page 697 for more information on the Collection Report.

Note: This command is disabled if a collection has never been performed. It is also disabled during a data collection.

Last Conversion Report

The Last Conversion Report command displays the Conversion Report from the last conversion. See page 707 for more information on the Conversion Report.

Note: This command is disabled if a conversion has never been performed.

Tools Menu

The commands in the Tools menu allow you to collect your price data automatically from Reuters DataLink, convert your data to and from various file formats, sort your securities, copy securities, delete securities and data, merge securities, and test the integrity of your data. You can also change the configuration settings for your modem, Reuters DataLink, and the program in general.

Download Prices

Download Prices button

The Download Prices command is used to automatically collect price data from Reuters DataLink. For information on manually updating securities see page 678 .

Before you can download prices, you must close all open datasheets.

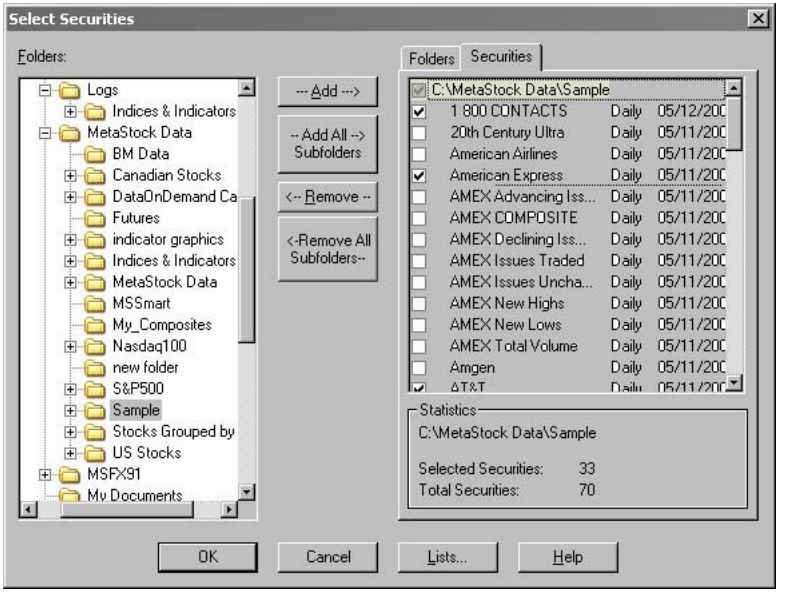
For more information on collecting data, see page 72.

To update your data

1. Close all open datasheets.
2. Select **Tools>** Download Prices.
   The Select Securities dialog appears (see page 692).
3. Select the folder you want to update, and click **Add**.
   You can repeat this step if you want to update multiple folders. You can also choose a list of securities that you have previously defined (see page 693 for more information on lists).
4. Click the **Securities** tab in the Selected Folders list if you want to choose specific securities to update within the folder.
5. After you are satisfied with the selections you have made, click **OK**. The Vendor Selection dialog will appear.
6. Verify that the content of the Vendor Selection and Vendor Options dialogs are correct, and click **OK** to connect and collect data.
   The QuoteCenter window appears (see page 696) giving you information about the status of the data collection.
7. After the data has been collected, the connection with Reuters DataLink is automatically terminated. The Collection Report window appears (see page 697) giving you information about the success of the update. A Security Report for each security is available from the Collection Report by selecting a security, then clicking **Details**. See page 754 for a complete list of status messages.

Select Securities Dialog

The Select Securities dialog is divided into two sections. The list on the left is a folder tree that you can use to select the data folders to update. The list on the right shows the folders/securities that have already been selected for update.



Add. Click this button to move the selected folder to the Selected list.

Remove. Click this button to remove the selected folders from the Selected list.

You can toggle between displaying folders and securities in the Selected list by doing one of the following:

- Double-click on the folder name.
- Click the folder name and click the **Securities** tab to show securities. Click **Folders** to show folders.

Lists. Use this button to display the Security Lists dialog from which you can edit and load pre-defined lists of securities. See page 693 for information on the Security Lists dialog.

To select the folder "Sample" for updating

Note: The normal location for your data is on your C: drive in folders beneath the folder named "MetaStock Data."

These instructions explain how to select the folder named "Sample".

1. Double-click the **C:** drive in the **Folders** tree on the left side of the Select Securities dialog.
2. Double-click the MetaStock **Data** folder.
3. Select the **Sample** folder beneath the MetaStock Data folder.
4. Click **Add**.
5. The Sample folder will now appear in the section on the right. By default, all securities in the added folder are automatically selected for updating.
   Click the **Securities** tab to verify this.

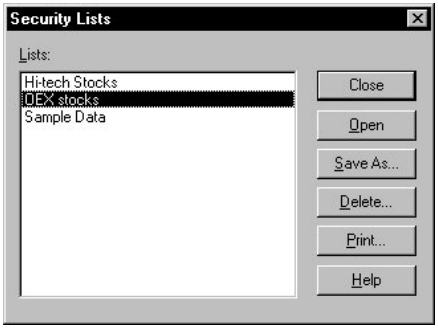
   Note: To quickly deselect all securities in a folder, simply clear the box next to the folder name under the security tab. Click this box again to reselect all securities.

Maintaining Lists of Securities

The Security Lists dialog lets you load and save predefined lists of securities to perform collections on. To display the Security Lists dialog click **Lists** in the Select Securities dialog.

Perhaps you want to divide your securities into specific categories. To do this, you could create a list that includes only computer stocks, another that contains only commodities, and another that contains only automobile stocks. Instead of having to select these individually each time for different data collections, you can group them into easily accessible lists.

The same lists that you create with The DownLoader can also be used in MetaStock's Explorer when selecting the securities to explore.



Open. Click this button to load the currently selected list into the Select Securities dialog. The existing folders will be replaced with the newly loaded folders.

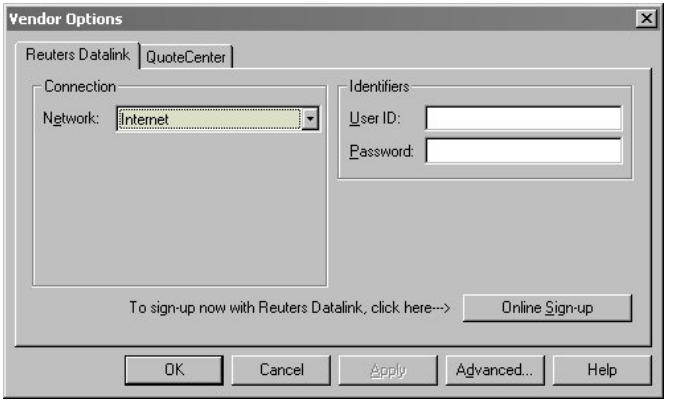
Save As. Click this button to assign the currently selected securities in the Select Securities dialog a name. You can create up to 104 named security lists.

Delete. Click this button to delete the selected security list.

Print. Click this button to print the selected security list.

Vendor Selection Dialog

The Vendor Selection dialog appears after you select the securities to update.



The page requests the ending date for the quotes and various other collection options as explained below.

Ending date. The Ending date controls how current the data will be.

Normally, you should simply accept the default current date appearing in the box to receive the most up-to-date data available. However, if you want to collect a block of historical data, you may want to specify a different ending date. For example, if you want to collect data for the year 1992 only, you should add a security (see page 663) with a starting date of 01/01/92 and then enter an Ending date of 12/31/92 when filling out the Vendor Selection dialog.

Delayed update. Choose the Delayed Update option if you want to specify the time(s) in the future to collect data. This is used if you want to collect data while you are away from your computer (e.g., out of town, on vacation, etc.). See page 695 for additional information on the Delayed Update dialog.

Recollect commodities. Choose the Recollect Commodities option if you want The DownLoader to collect the actual open-interest and volume for futures and commodities. Open interest and volume are not reported by the exchanges until the following day.
The DownLoader recollects the last day of data on all futures and

commodities and overwrites the existing data with the newly recollected data.

Please note that futures and futures options symbols must have the "@" character at the beginning to recollect the quotes. The “@” instructs The DownLoader to store the open interest and volume collected with today’s quote in the previous day’s record.

A normal stock split reduces the price and increases the number of shares held.

Automatic stock split. Select this box if you want The DownLoader to automatically adjust for stock splits when collecting data. If this box is not selected, The DownLoader will ask you for your approval before performing the stock split.

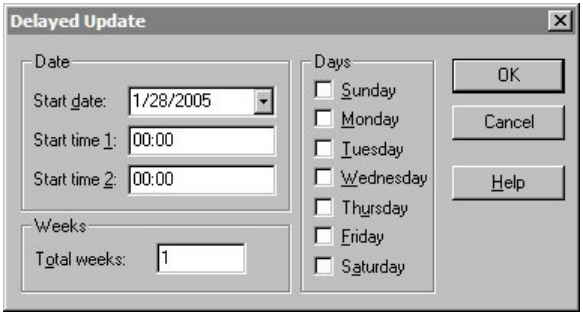
Vendor Options. Click this button to display the Vendor Options dialog for Reuters DataLink. For more information on this dialog, see page 728.

If The DownLoader attempts a delayed update while a datasheet for one of the securities in the download list is open, a message will appear. If the message remains on the screen for more than 10 minutes, The DownLoader will automatically close everything and begin the delayed update collection process.

Delayed Update Dialog

The Delayed Update dialog only appears if you have marked the Delayed Update box in the Vendor dialog. The delayed update feature lets you update your securities while you are away from your computer. This can be especially useful if you want to collect data during off-peak hours, while you are on vacation, etc.

Most of the commands in the Tools menu are unavailable during a delayed update.



Start date. Type the date the data collection process should begin. The date is based on your computer's internal clock.

Start time 1 and 2. Type the time the data collection process should begin. The time is based on your computer's internal clock and should be entered using a 24 hour clock (e.g., 4:00 PM is 16:00).

You may enter two different times for the delayed update to occur.

Total weeks. Type the number of weeks the data collection process should occur. For example, entering "2" causes The DownLoader to perform the data collection process (on the days specified) for two weeks. Type a "1" if you want data collected on the days specified for only the current week.

Days. Select the days of the week on which the data collection process should take place.

To perform a delayed update

1. Select **Tools>** Download Prices.
2. Select the securities to update from the Select Securities dialog, and click **OK**.
3. Select the Delayed Update box and click **OK**.
   The Delayed Update dialog appears.
4. Complete the dialog with the desired update settings and click **OK**. The Waiting for Update window appears showing the current time and the update time. When the current time equals the update time, the update process will begin.

QuoteCenter

The QuoteCenter window appears during the data collection process. The QuoteCenter window shows the number of records collected for the current security and the total number of records collected during the current downloading session. It also displays information about the speed and performance of the data collection (i.e., Characters Per Second and Quotes Per Minute).

If you click **Cancel** while the QuoteCenter window is displayed, the data collection will be terminated. Only the data that has been collected up to that point will be stored to your security files.

After the data has been collected, the Collection Status window appears as the data is stored to the files on your disk. This window displays the security name, the number of records processed, and the number of errors and warnings (if any).

Message symbol (Reuters DataLink only)

Reuters DataLink can send text-based messages to customers in order to relay important information. For example, Reuters DataLink can send general information messages to all customers or they can send messages to individual customers regarding their account. The DownLoader receives messages and displays them in the Collection Report after the data is collected (see page 697). If you receive a message, a special symbol and will appear in the collection report that appears as an envelope. “Message from Reuters DataLink” will appear next to the symbol.

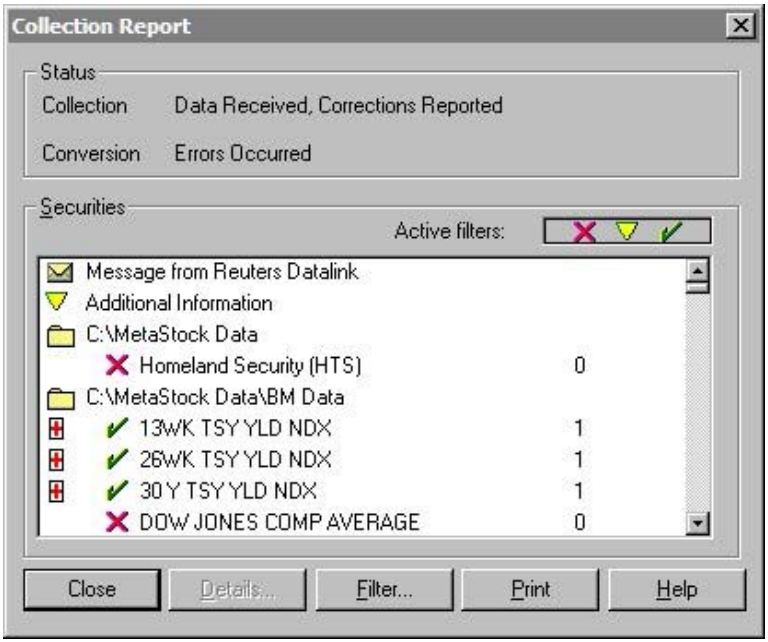
Error correction symbol (Reuters DataLink only)

Another unique feature offered by the Reuters DataLink service is called AutoClean™. AutoClean is a feature that ensures that the data

you have collected is as error-free as possible. For example, if you are following IBM, and a correction to IBM's volume is reported for a date three weeks ago, the corrected volume will automatically be sent and stored to your IBM data file. All this occurs without you doing anything. This unique feature takes the hassle out of maintaining clean data. If you receive an error correction, a special symbol will appear next to the affected security in the Collection Report.

Collection Report

The Collection Report appears after the data collection is complete. This report provides status messages for each security in the data collection.



The following table shows the various symbols that appear in the Collection Report and their meaning.

Symbol	Meaning
✔	Data was successfully parsed and stored to the file.
▽	Data was parsed and stored, but warnings exist.
✘	Some (or all) data was not stored because of errors.
✚	Corrections to existing data were automatically made.
2:1	Existing data was adjusted for a split or distribution.
✉	A message has arrived from Reuters DataLink

The Additional Information line at the top of the Collection Report contains information about the collection session in general (i.e., communication errors, etc.).

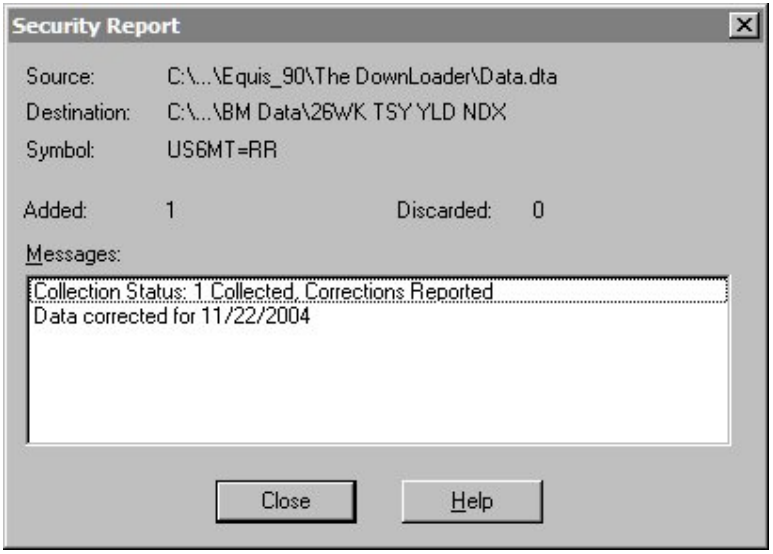
Click **Help** to see a description of the selected message.
See page 754 for a complete list of Collection Report messages.

Click **Filter...** in the Collection Report to view only those securities meeting a specific status. The active filters are displayed in the Active Filters box in the Collection Report.

You can also edit or delete the securities in the Collection Report. First, select the desired securities, then right-click on one of the highlighted securities. A menu appears for you to choose from.

You can view the most recent Collection Report at any time by selecting **View>** Last Collection Report (see page 690).

To see more detailed information, select the security and click **Details** to display the Security Report.



Express Download (The DownLoader)

SHIFT+click on the Download Prices button (above) on the toolbar to perform an Express Download.

Many people perform the same downloading routine day after day—updating their securities with the most recent day's data. For those that do this, the Express Download command can be a real time-saver. Select **Tools>** Express Download in The DownLoader, or from the Equis International program group in your Windows Start menu.

The Express Download command quickly bypasses all the initial setup required to start a downloading session (i.e., security selection). When you choose Express Download, the same setup as your last downloading session is automatically used.

Adjust

The Adjust command modifies groups of securities simultaneously.
Choose Adjust First Date to adjust the first date of a group of securities.
Choose Adjust Data for Multiple Securities to adjust any price field (open, high, low, close, volume, open interest) for a group of securities.
Choose Adjust Start and End Times to adjust the starting and ending trading times for a group of intraday securities.

Adjust First Date

The Adjust First Date command allows you to easily change the first date of collection for multiple end-of-day securities. The first date may not be adjusted for intraday securities.

If you decide that the data you've already collected does not cover the historical scope you need, this feature will allow you to specify the first date of each security in one folder simultaneously, without the need to manually change each date, or collect an entirely new security file. The first date may only be adjusted backward.
To change the first date to a later date, use the Delete Data command (see page 716).

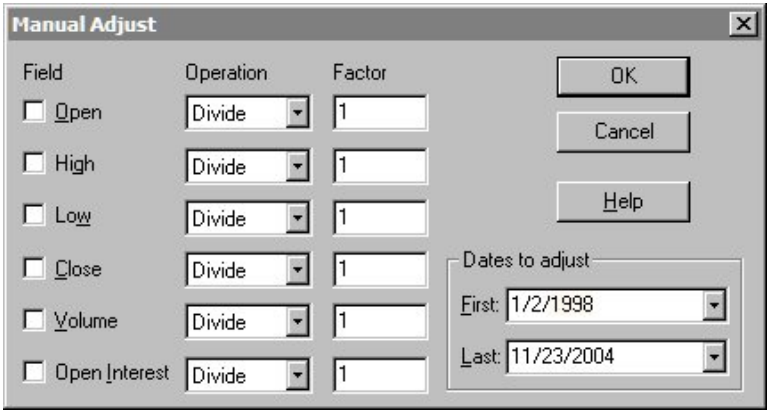
To adjust the First Date for multiple securities

1. Select **Tools>** Adjust First Date.
2. Select the individual securities, or click **Browse** to find the securities folder you want to adjust.
3. Click **Adjust** .
4. Type or select the new date.
5. The next time you collect data, the security(s) will be updated with new data starting at the new date you specified.

Adjust Data for Multiple Securities

This command is used to adjust the price data for the selected securities. Each data field for every record within the selected security files can be adjusted by using a combined operation and weighting factor. For example, you could multiply all the volume records for every selected security by 100. Or you could use this command to adjust your securities for the Euro (see page 701).

Please use caution when applying this command. Once adjustments are made, it may be difficult to bring the data back to its original state.



An Operation drop-down list box and a Factor box appear to the right of each of the data fields. These are used to specify adjustments to the individual data fields.

Operation. Select the desired operator to use when adjusting the data field.

Factor. The Factor is the value by which the data field will be adjusted.

Dates to adjust. You are prompted to enter the range of data by typing the first and last dates to adjust. For example, if needed to adjust all your old volume data, you would likely enter the first date in the file in the First date box, and the date before you switched in the Last date box.

To adjust data for a group of securities

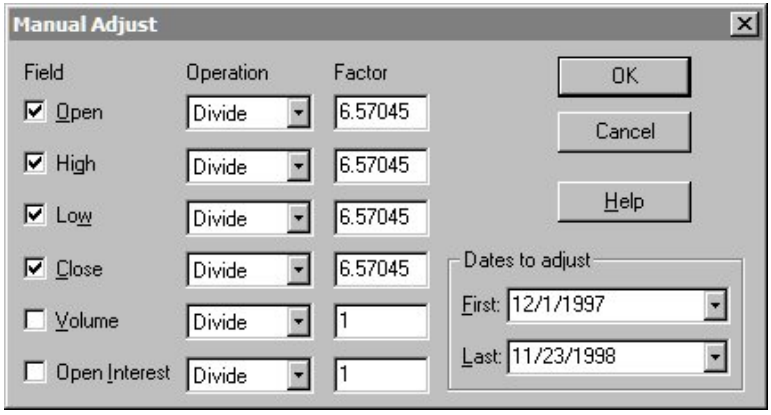
1. Select **Tools>** Adjust> Data for Multiple Securities.
2. Choose the securities you would like to adjust.
   To select multiple securities, hold down the control or shift key while clicking on the securities. If the securities are in a different folder, click **Browse** to select a new folder.
3. After you have selected the securities, click **Adjust**.
4. Mark the boxes for the fields you want to change.
5. Choose the appropriate Operation for each field from the drop-down list.
6. Enter the Factor for each field.
7. Enter the first and last dates of data you would like to adjust.
8. Click **OK**.

Euro Conversion

If you follow securities that are affected by the European Monetary Union's (EMU) conversion to the Euro, then the Adjust Data for Multiple Securities command in the Tools menu will be helpful for converting your security prices to the EURO.

The EURO conversion rate —also called "locking rate"— for each of the affected currencies was fixed on December 31, 1998. All security prices beginning January 4, 1999 (the first business day of 1999) in the EMU countries are quoted in Euros. Your historical prices prior to January 4, 1999 will likely need to be converted to the EURO equivalent.

For example, if one EURO is determined to convert to 6.57045 French Francs. You should adjust your historical securities (valued in Francs) by selecting **Tools>** Adjust> Data for Multiple Securities. Select the affected securities and fill out the dialog as follows:



Notice that while the prices are divided by 6.57045, the volume and open interest is left unadjusted. The last date to adjust is set to 12/31/1998 (i.e., the last date the securities were valued in Francs).

Before proceeding with your conversions (especially if you are converting a lot of securities), please back-up your data. Backing up is highly recommended in case problems arise with the conversion (i.e., wrong conversion rate, mistyped rate, wrong operator selected, hardware failure, etc.).

You may also want to contact Reuters DataLink for specific instructions regarding the Euro conversion process. An alternative to adjusting your locally stored data is to re-collect the data from Reuters DataLink. If your data vendor adjusts its historical data for the Euro, then replacing all of your historical data with new Euro-valued data may be the best option.

Please note that the above conversion information is only for illustration purposes and does not represent actual conversion values.

Adjust Start and End Times

The Adjust Start and End Times command allows you to easily change the start and end times for multiple intraday securities.

If the trading time for a group of securities you follow changes, you can update your entire database, or just a few securities, simultaneously without the need to manually change each security.

To adjust the Start and End times for multiple securities

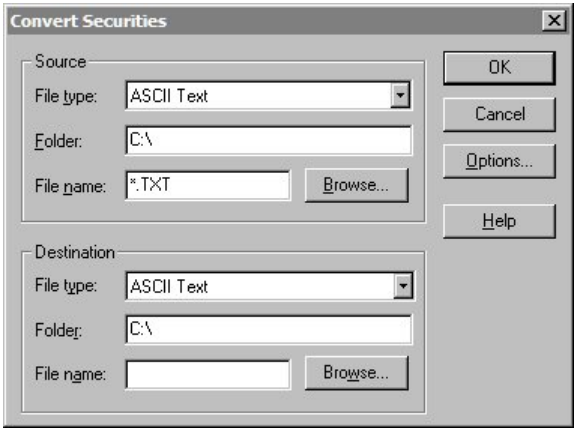
1. Select **Tools>** Adjust Start and End Times.
2. Select the individual securities, or click **Browse** to find the securities folder you want to adjust.
3. Click **Adjust**.
4. Mark the boxes to select the times you want to change.
5. Type or select the new times.
6. Click **OK**.

Convert

Convert button

Use the Convert command to convert security files to and from different file formats. For example, you can use this command to convert your MetaStock files to an Excel spreadsheet format. You could also convert your Quattro files to an ASCII file. The six file types supported are AIQ, ASCII, Excel, MetaStock, Quattro/123, and TC2000.

Convert Securities Dialog



File type (source). Choose the file type of the file you want to convert from the drop-down list. See page 708 for information on how to correctly format ASCII files for conversion. See page 711 for information on how to correctly format Quattro/123 and Excel files for conversion.

Folder (source). Type (or select with **Browse**) the folder containing the files you want to convert.

File name (source). If the source type is MetaStock, the ticker symbol(s) selected for conversion will appear in the File Name box. Click **Browse** (see page 666) to make your selections. If the source file is other than MetaStock, the file names will appear in the File Name box.

You can select multiple securities by holding down the CTRL or SHIFT key as you click.

Browse (source). Select the folder and/or the securities you want to convert by clicking **Browse** (see page 666). Clicking this button displays the Open dialog from which you can choose the security(s) to convert. See page 678 for more information on the Open dialog.

If the source file you are converting is not MetaStock format, the Choose Source dialog appears prompting you to enter the file type extension. If you do not enter a symbol, the symbol will be generated from the source file's name.

File type (destination). Choose the file type you wish to convert to from the drop-down list. The available file types are ASCII, Data Interchange Format (DIF), Excel, MetaStock, and Quattro/123.

Folder (destination). Type (or select) the target path for the converted files.

File name (destination). Type the file name you want to assign to the security.

If you want the converted data to be appended to an existing file, select the existing file's name with **Browse** (see page 666).

If you are converting multiple files, leave this entry box blank.

Browse (destination). Select the folder and/or the file name you wish to convert into by clicking **Browse** (see page 666).

To convert security files from one type to another

1. Select **Tools>** Convert.
2. Specify the File type, Folder, and File name information for the source and destination files in the Convert Securities dialog.
3. Click **Options** to specify any special instructions regarding the source and destination files.
4. After you have completed the dialog, click **OK** to begin the conversion process.
5. Locate the converted file in the specified Destination Folder.

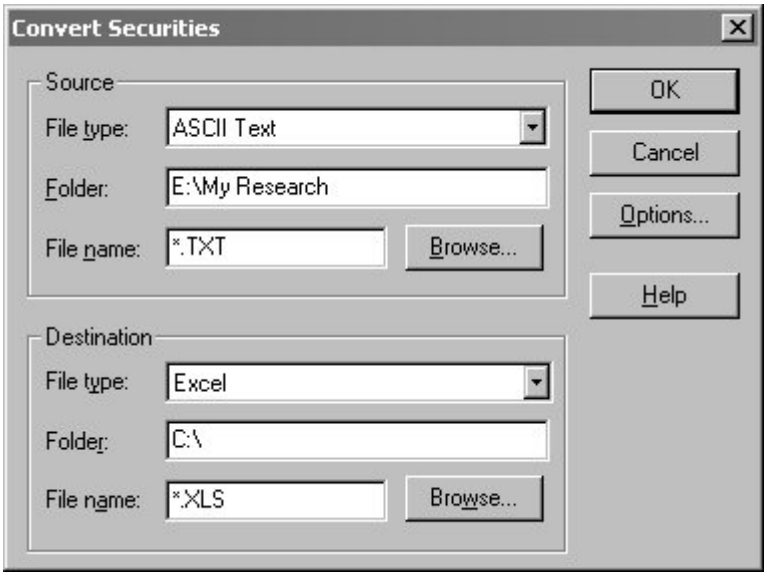
Converting Multiple Files with The DownLoader

You can select multiple securities by holding down the CTRL or SHIFT key as you click.

You can use The DownLoader to quickly convert multiple files. In the Open dialog, select the files you want to convert. Each of the selected files will appear in the Source File Name box in the Convert Securities dialog.

If you use a special wildcard file name for the Destination File Name (e.g., *.txt, *.prn, etc.), each of the destination files will automatically be assigned a file name with the wildcard extension. The DownLoader creates the file names based on the ticker symbol (or file name), periodicity, and interval of the source files.

The following illustration shows the Convert Securities dialog set up for converting multiple ASCII files into Excel files. Each of the selected ASCII files will be converted to an Excel file with a *.XLS extension.



If you want to convert all files beneath a specific folder then use the Traverse source folders option in the Conversion Options dialog (see page 707).

For example, to convert three folders of ASCII data below c:\MetaStock Data (e.g., c:\MetaStock Data\stocks, c:\MetaStock Data\futures, and c:\MetaStock Data\indices), you could specify "`c:\MetaStock Data`" as the Source Folder and mark the Traverse source folders checkbox.

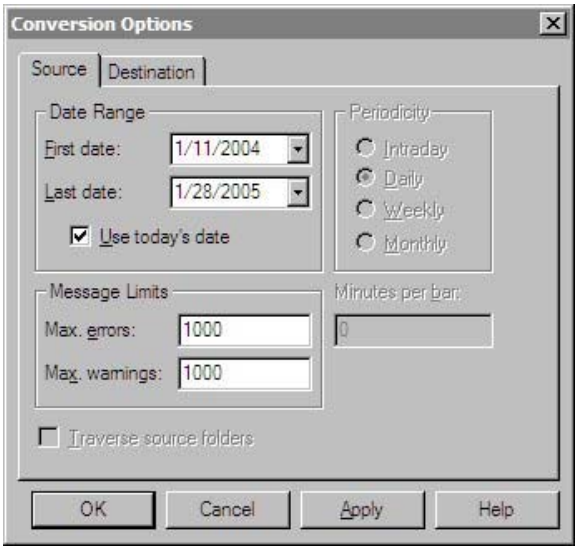
Conversion Options Dialog

The Conversion Options dialog consists of two pages: one for specifying the Source file options and the other for specifying the Destination file options.

Source tab

The Source file is the file being converted.

Choose Source from the Conversion Options dialog. This page is used to specify options for the conversion of the source file.



Date Range. Type the First date and Last date for the range of data you want to convert. Mark the Use today's date checkbox so the Last date box will always contain the today's date (by default).

Message Limits. Type the number of Maximum errors and Maximum warnings you want to receive when converting the data. This has no effect on the outcome of the conversion--it is strictly for informational purposes. See page 738 for a complete list of error messages.

Periodicity. Choose the Periodicity of the source file. If the source file type is MetaStock or the periodicity checkboxes are disabled.

Minutes per bar. If you have chosen Intraday for the periodicity, you must specify the Minutes per bar setting of the source file.
For example, if the source file is an intraday, 5-minute file, then type "*5*" in the box.

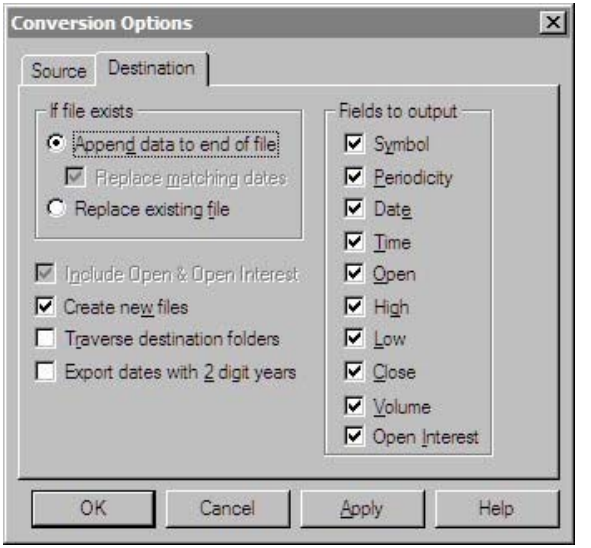
Traverse source folders. Mark this box if you want all folders beneath the specified source folder to be included in the conversion. For example, specifying *c:*\MetaStock *Data* would cause all security files in c:\MetaStock Data\stocks, c:\MetaStock Data\futures, etc. to be converted. This option is often used when converting TC2000 data (see page 712).

Note: If the source file type is “MetaStock”, this checkbox is disabled.

Destination tab

A Destination file is the file that is created from the conversion process.

Choose Destination from the Conversion Options dialog. This page is used to specify options for the creation of the destination file.



If the file exists.

- Mark Append data to end of file if you want to append the source file to the end of the destination file.
- Mark the Replace matching dates box if you want the source file's dates to replace the matching dates in the destination file.
- Mark Replace existing file if you want the converted source file to replace the existing destination file.

Include open and open interest. Mark this if you want the MetaStock destination file to include fields for open and open interest. The MetaStock format can have either five data fields (date, high, low, close, volume) or seven data fields (date, open, high, low, close, volume, and open interest).

Create new files. If this box is unmarked, new security files will not be created in the destination folder. The data in the source file will only be appended to or replace existing files (depending on your selection).

For example, suppose you have an ASCII file with thousands of different securities and their prices, and the MetaStock security files you want to append this data to are scattered across numerous folders.

You should clear the Create new files checkbox so that new files are not created for securities that don't exist in the destination folders.

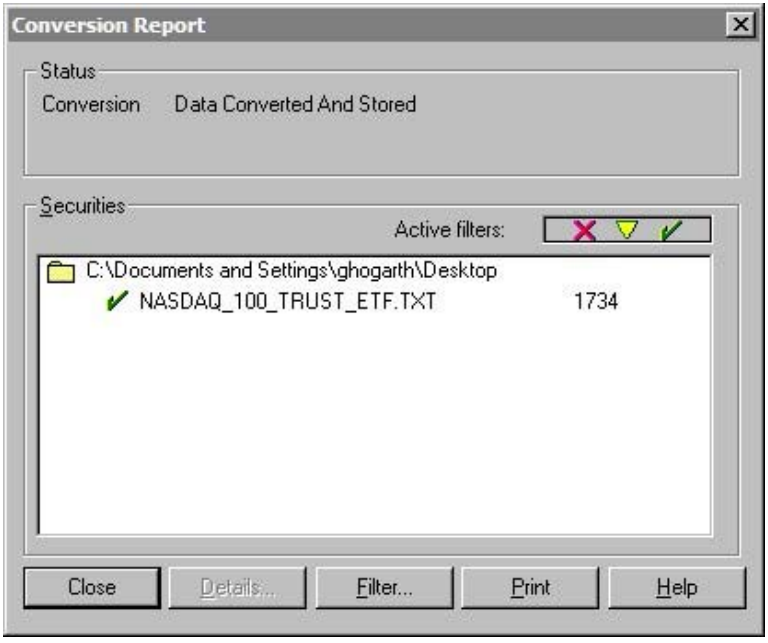
Traverse destination folders. Mark this checkbox if you want converted data to be stored in the folders beneath the specified Destination folder.
For example, specifying *c:\MetaStock Data* would cause all security files in `c:\MetaStock Data\stocks`, `c:\MetaStock Data\futures`, etc. to be written to during the conversion. If a file to which the converted data can be appended does not exist in any existing folders, a new folder will automatically be created beneath the specified Destination folder. The newly created folders are named "A", "B", "C", "D", etc. corresponding to the first letters of the converted securities' names. If you need the converted data to be stored in only one specific folder, then leave this box unmarked.

Export dates with 2 digit years. Mark this checkbox to export the dates in the source file with two digit years (i.e., 98 rather than 1998).

Fields to output. Mark the output fields you want to include in the destination file. Output fields cannot be specified if the destination file type is MetaStock.

Conversion Report

After a conversion is complete the Conversion Report appears showing the results of the conversion process.



A green check mark next to the file means that data was successfully converted and stored. A yellow triangle means that warnings exist. A red X means that errors exist.

If either a red X or a yellow triangle appears in the Security Report, select the security and click **Details** to find out more about the warnings or errors. You can select any of the errors or warnings displayed in the report and click **Help** for more information.

Click **Filter** in the Conversion Report to view only those securities meeting a specific status.

Note: You can also edit or delete the securities in the conversion report. First, select the desired securities, and then right click on one of the highlighted securities. A menu appears for you to choose from.

After converting your data to a MetaStock format, you may want to test your data using the Test feature (see page 722) to find such problems as dates out of order, invalid high-low-close relationships, etc.

Ticker Symbol dialog

If the source file you are converting does not have a ticker symbol, the Ticker Symbol dialog will appear prompting you to enter a symbol. If you do not enter a symbol, the symbol will be generated from the source file's name.

ASCII Source File Layout

In order for an ASCII source file to convert properly, the file must be arranged correctly. This section explains the proper alignment.

The data in the ASCII file should be arranged as shown below.

```
<ticker>, <per>, <date>, <time>, <open>,
<high>, <low>, <close>, <vol>, <o/i>
```

An ASCII source file can also contain a <name> field. This is helpful if your destination file is in the MetaStock format and you want the name of MetaStock file to be different than the ticker symbol. If you choose to include a <name> field in your ASCII file, you must define a header line, otherwise the conversion will fail. The following header line is an example.

```
<ticker>, <name>, <per>, <date>, <close>,
<vol>
```

<ticker> The ticker symbol of the security. The ticker symbol is used to determine which MetaStock data file to post the data to. The ticker symbol (if you choose to specify it in the ASCII file) must be included on every line of data.

If the ticker symbol in the ASCII file does not match a ticker symbol in the MetaStock data files, you will be asked if you want to create a new MetaStock data file.

If the ticker symbol in the ASCII file includes a space, a comma-delimited header line must be created at the top of the ASCII file (see page 710 for how to create a header line). The header line allows the file to be processed using only commas as delimiter characters.

The ticker field can be omitted, but only if the <per> field is also omitted. If the ticker symbol is omitted, you are prompted to supply the ticker symbol (see page 708).

<per> The periodicity of the data (e.g., Intraday, Daily, Weekly, Monthly, or Yearly). If this field is omitted, the periodicity selected in the Conversion Options dialog is used (see page 704).

<date> The date of the data contained on the line of the ASCII file. Each line of the ASCII file must have a date. The date can be in either the yyyymmdd or mm/dd/yyyy formats (e.g., 19891222 or 12/22/1989), and can use either 2-digit or 4-digit years.

When using 2-digit years in Windows 98 or later, The DownLoader will use the Regional Settings found in your Windows Control Panel.

The dates must be in ascending order (i.e., most recent date is listed on the last line).

If the dates in the ASCII file precede the dates in the existing MetaStock file (i.e., the file you are appending to), the data will be ignored.

<time>. The time of the data contained on the line of the ASCII file. This field should only be used if the ASCII file contains intraday price data (i.e., the periodicity is intraday). The time should be entered using a 24 hour clock (e.g., 3:30 PM = 15:30).

<open> The opening price of the security. The open field can be omitted if the open interest (<o/i>) field is also omitted.

<high> The high price for this date.

<low> The low price for this date.

<close> The closing (last) price for this date.

<vol> The volume for this date.

<o/i> The open interest for this date. The open interest field can be omitted if the open (<open>) field is also omitted.

Example Input:

```
IBM,D,7/29/86,121,122.375,120.500,121.75,62458
9,0
IBM,D,7/30/86,123.375,123.125,122.5,122.75,431
234,0
MOB,D,7/29/86,28.25,29.5,27.125,28,12627,0
MOB,D,7/30/86,30,30.625,29.875,30.375,7588,0
```

Because the <open> and <o/i> fields are optional, this data also could be arranged as shown below.

```
IBM,D,7/29/86,122.375,120.500,121.75,624589
IBM,D,7/30/86,123.125,122.5,122.75,431234
MOB,D,7/29/86,29.5,27.125,28,12627
MOB,D,7/30/86,30.625,29.875,30.375,7588
```

If all the data in the ASCII file is for one security only, then the <ticker> and <per> fields can be omitted. The data can be arranged as shown below. You will be prompted for the ticker symbol.

```
7/27/96,41.375,40.5,40.75,524589
7/38/96,42.5,40.5,41.75,345679
7/29/96,42.375,41.125,41.75,678967
7/30/96,43.625,42.500,43.125,564479
```

If all the data in the ASCII file is for one security only, then the <ticker> ,<per>,<high>,<low>, and <vol> fields can be omitted. The data can be arranged as shown below. You will be prompted for the ticker symbol.

```
7/27/96,40.75
7/38/96,41.75
7/29/96,41.75
7/30/96,43.125
```

In the resulting MetaStock files, the other price fields will be automatically filled with the close values. The volume fields will be filled with zeros.

A header line can be placed at the top of the ASCII file to specify the arrangement of the data. This allows you to arrange the data in any order you wish. The line below shows volume appearing before the price fields.

```
<date>,<vol>,<high>,<low>,<close>
7/29/86,624589,122.375,120.500,121.75
7/30/86,431234,123.125,122.5,122.75
7/29/86,12627,29.5,27.125,28
7/30/86,7588,30.625,29.875,30.375
```

Quattro/1-2-3 and Excel Source File Layout

In order for a Quattro/1-2-3 or Excel source file to convert properly, the spreadsheet must be arranged correctly. This section explains the proper arrangement.

Note: Both Quattro and 1-2-3 spreadsheets must be saved as WKS files to convert properly.

To convert a Quattro, 1-2-3, or Excel source file

1. The data must be in columns.
   Each column must have a heading that describes what data is in the column. The only required columns are DATE and CLOSE. Optional columns are TICKER, PER, OPEN, HIGH, LOW, VOLUME, and O/I. The column names must be spelled as shown here. The column headings must all be on the same row.
2. The dates must be in the *mm/dd/yy* style and must be formatted as text labels (i.e., the @DATE function cannot be used).
3. The data must be in ascending order (dates increase as you move down the spreadsheet).
4. The spreadsheet cannot be open when attempting to perform the actual conversion in The DownLoader.

Example:

The following illustration shows how an Excel spreadsheet should appear to convert properly. Quattro and Lotus1-2-3 spreadsheets should appear similarly.

test

	A	B	C	D	E
1	DATE	HIGH	LOW	CLOSE	VOLUME
2					
3	07/08/96	79.375	76.875	77	7647
4	07/09/96	78.625	77.125	77.25	8079
5	07/10/96	78.375	75.875	76.625	7274
6	07/11/96	77	75.5	76.625	13622
7	07/12/96	78.625	76.5	78.5	8393
8	07/15/96	79	73.5	75	11766
9	07/16/96	75.25	71.125	73.625	10596
10	07/17/96	75.75	74.125	75.375	7779
11	07/18/96	75.125	73	74.875	10285
12	07/19/96	75.25	71.5	72.75	10078
13	07/22/96	70.625	68.125	70.25	16379
14	07/23/96	72	70.125	70.125	11839

TC2000 File Conversion

TC2000 data files are stored in a series of folders beneath the "c:\tc2000\data" folder. For example, all securities beginning with the letter "A" are located in the "c:\tc2000\data\a" folder. All securities beginning with the letter "B" are located in the "c:\tc2000\data\b" folder, etc. Rather than converting these folders one at a time, specify the Source Folder as "c:\tc2000\data" and mark the Traverse source folders checkbox in the Conversion Options dialog (see page 707).

If you need to convert more than 2,000 TC2000 data files at once, be sure to also mark the Traverse destination folders checkbox in the Conversion Options dialog (see page 707). All securities beginning with the letter "A" will be stored in a destination folder named "A" beneath the specified destination folder. All securities beginning with the letter "B" will be stored in a destination folder named "B" beneath the specified destination folder. And so forth. The only exception to this is if a matching security (same ticker symbol and periodicity) is found beneath the specified destination folder, in which case the security's data is simply appended to the matching file.

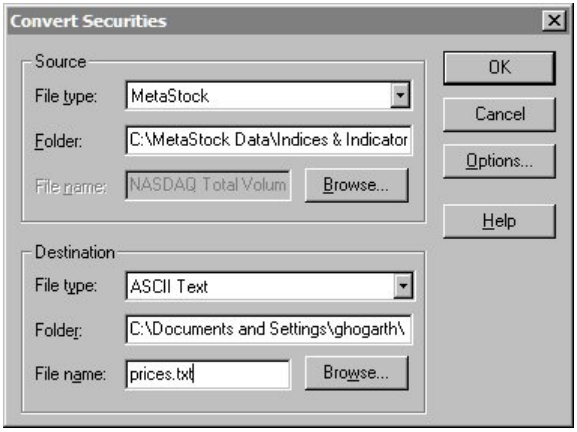
Converting MetaStock Data for Quicken

Quicken (by Intuit Inc.) is a popular home financial management program. Quicken includes a portfolio management feature. To use this feature effectively, you need to keep the portfolio's security prices up-to-date. The DownLoader can be used to collect and convert data into an ASCII format that Quicken can import.

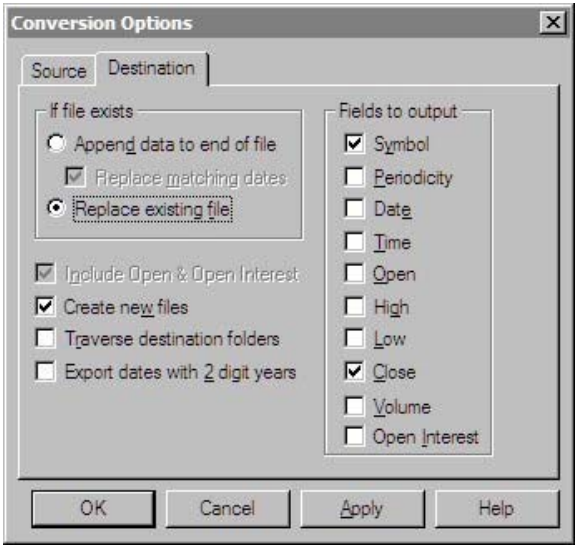
To convert data to a Quicken-compatible ASCII format

1. In The DownLoader, select **Tools>** Convert.
2. Choose MetaStock from the Source File Type drop-list.
3. Type in the path to the Source Folder. This is the folder where your MetaStock data is located (e.g.,`c:\MetaStock Data\sample`).
4. Click **Browse** and select the securities to export from the **Choose Source Securities** dialog.
5. Click **OK**.
6. Choose ASCII from the Destination File Type drop-list.
7. Type in the path to the Destination Folder. This is the folder where your Quicken program is located (e.g., `c:\quickenw`).

8. Type in a destination file name (e.g., *prices.txt*).
   The Convert Securities dialog should now appear similar to the following:



9. Click **Options**, and select the Destination tab.
10. Click **Replace existing file** and mark the Create new files checkbox. For the fields to output, choose Symbol and Close.



11. Click the **Source** tab.
12. Type the date you want to export in the First Date and Last Date boxes (i.e., type the same date in both boxes).
13. Click **OK** to return to the Convert Securities dialog.
14. Click **OK** in the Convert Securities dialog to begin the conversion.

15. When the conversion is done, run Quicken and use their "Import Prices" feature to import the prices in the ASCII file. See your Quicken manual (or online help) for more information.

Intraday Data File Conversion

Intraday data files can be imported and exported with The DownLoader. The MetaStock file format supports a time field for intraday data files created by programs like MetaStock Professional.

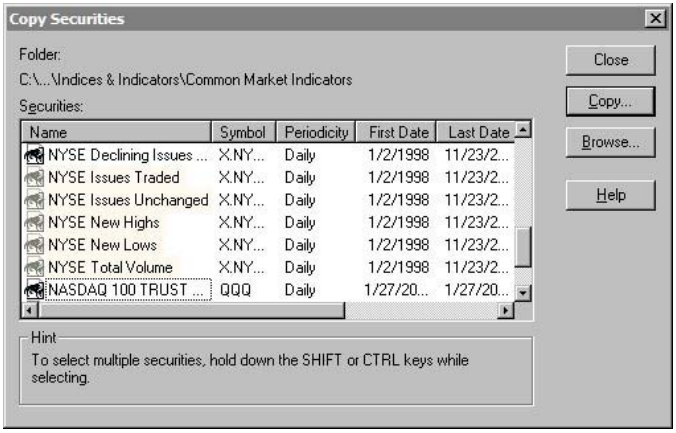
The Time column in the data pane of an intraday security displays time in the HHMMTTT format, where HH is hour of day (using a 24-hour clock), MM is the minutes (0 to 60) and TTT is the tick count (0 to 999).

When exporting intraday data files, tick counts that go beyond 59 are held constant at 59. This is to ensure compatibility with software that expects traditional two digit "seconds" (not ticks) in this field. For example, the times of 10:19:60, 10:19:61, and 10:19:62 would all export with the time of 10:19:59.

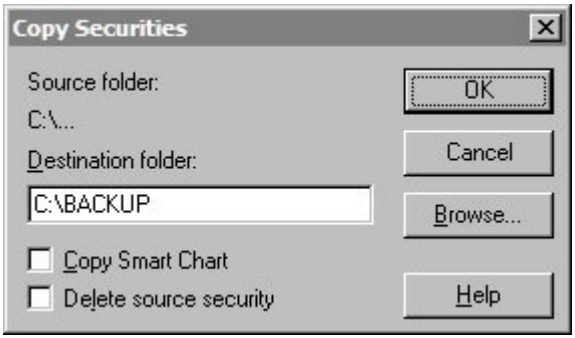
When importing intraday data files that have the tick count held constant at 59, The DownLoader automatically increments beyond 59 up to 999 (if necessary). For example, records with times of 12:34:59, 12:34:59, and 12:34:59 would import with the times of 12:34:59, 12:34:60, and 12:34:61, respectively.

Copy

Use the **Copy** command to copy the selected securities to another drive or folder. A folder can hold up to 2,000 securities (however, we recommend that you limit your securities to 1,000 per folder to maximize the program's speed and efficiency).



Copy. Click **Copy** to display the Copy Securities dialog.



The Copy Securities dialog is used to specify the destination folder for the copied files. If you type (or select with Browse) a folder that does not exist, The DownLoader will ask if you want to create it.

Mark the Copy Smart Chart box if you want the Smart Chart information copied with the security file (see the MetaStock *User's Guide* for more information on Smart Charts).
Mark the Delete Source Security box if you want the source security deleted after being copied to the new location.

Browse. Click **Browse** to display the Select Folder dialog (page 666). Use the Select Folder dialog to change the data folder displayed in the Copy Securities dialog.

To copy securities

You can select multiple securities by holding down the CTRL or SHIFT key as you click.

1. Select **Tools>** Copy.
2. Select the securities you want to copy.
3. Click **Copy**.
   The Copy Securities dialog appears prompting you to type (or select with **Browse**) the folder you want to copy to.
   Mark the Copy Smart Chart box if you want the Smart Chart(s) to be copied along with the data.
4. Click **OK**.

Delete

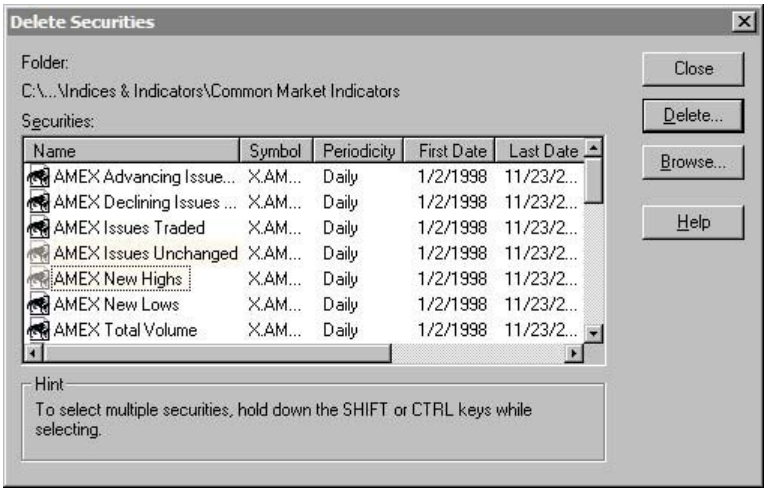
The Delete command deletes securities or data.

- Choose Securities if you want to delete the actual security file (data and all).
- Choose Data if you want to delete price data from a security file.

Delete Securities

Use the Delete Securities command to delete the selected securities from the folder.

IMPORTANT: Once a security is deleted it ***cannot*** be recovered (even from the Recycle bin).



Delete. Click **Delete** to delete the selected securities. You will be asked to confirm the deletion of the selected securities.

Browse. Click **Browse** to display the Select Folder dialog (see page 666).
Use the Select Folder dialog to change the data folder displayed in the Delete Securities dialog.

To delete securities

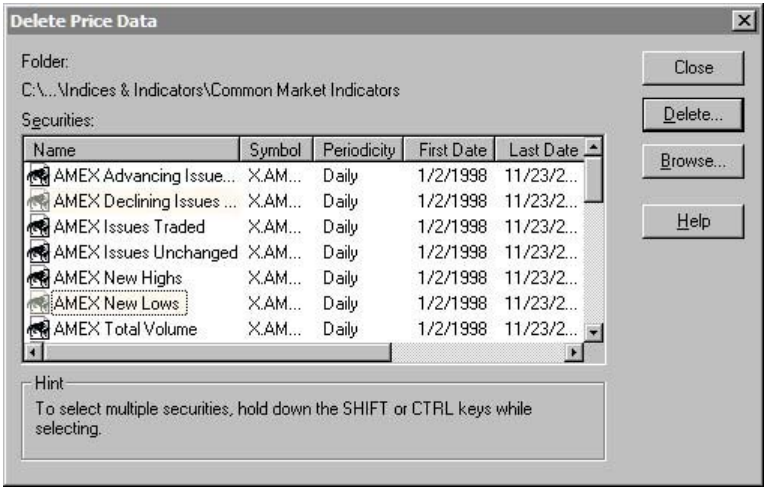
1. Select **Tools>** Delete> Securities.
2. Select the security(s) you want to delete.
3. Click **Delete**.
4. Choose **Yes** when asked if you are sure you want to delete the security(s).

Delete Data

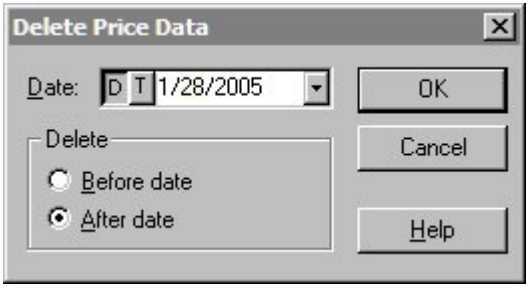
Use this command to delete a specified range of data from the selected securities. You are prompted to specify whether to delete before or after a certain date.

This command is useful for deleting large amounts of data from multiple securities--perhaps to free up disk space or to correct errors.

Note: If you just need to delete a few records from a single security, you may find it easier to open the security's datasheet, highlight the rows, and select **Edit>** Delete Row (see page 689).



Delete. Click **Delete** to display the Delete Price Data dialog.



Use the Delete Price Data dialog to specify the amount of data to delete from each of the selected securities. Select Before date or After date, depending on whether you want to delete data before or after the date you type in the Date box.

Browse. Click **Browse** to display the Select Folder dialog (see page 666) . Use the Select Folder dialog to change the data folder displayed in the Delete Price Data dialog.

To delete data from multiple securities

1. Select **Tools>** Delete> Data.
2. Select the securities you want to delete data from.
3. Click **Delete**.
   The Delete Price Data dialog appears, prompting you to specify

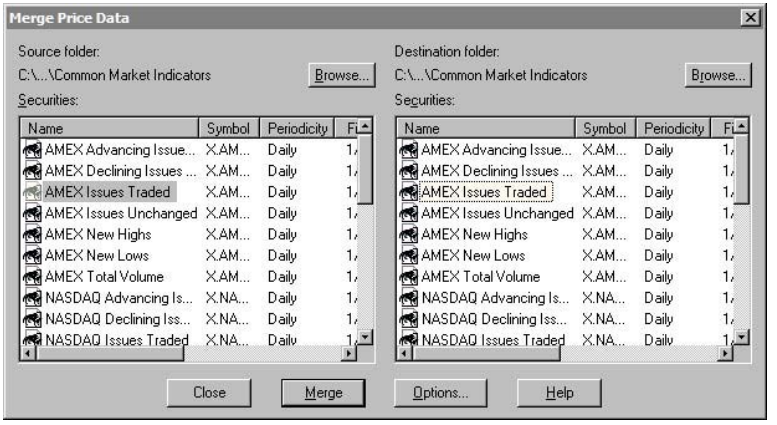
the data to delete. Select Before date or After date and type in the date.

4. Click **OK**.

Merge

This command is normally used when you want to add additional historical data to an existing file. For example, suppose you have data for XYZ security from January 1, 1999 to the present and want to add 1998 data from another XYZ security file —you could use the merge command to accomplish this.

If the two files have overlapping data, any "holes" (i.e., missing data) in the destination security will be filled with the source security's data.

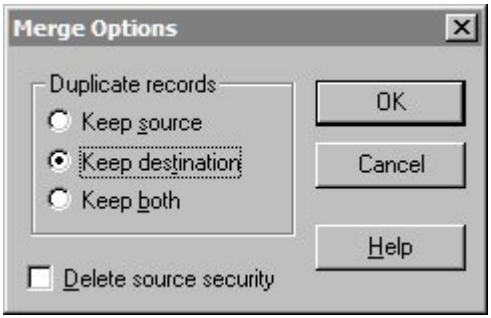


Browse. Click **Browse** to change the Source and Destination data folders. After clicking **Browse**, the Select Folder dialog appears (page 666). After you select the desired data folder from the tree, the Merge Price Data dialog will display the securities in the selected folder.

Merge. Click **Merge** to merge the selected source security with the destination security. Although the source security is merged with the destination security, the source security remains unaltered.
Of course, the destination security will contain the newly appended data from the source security.

Options. Click **Options** to specify how to handle duplicate records between the source and destination securities. You can choose to

keep the source records, keep the destination records, or to keep both source and destination.



Note: If you decide to keep both the source and destination files, there will be duplicate records for that date saved in the destination file.

Mark the Delete source security box if you want the source security deleted after merging the source and destination securities.

To merge securities

1. Select **Tools>** Merge.
2. Select the Source security from the dialog (this is the file that adds the data). This is usually the most current data.
3. Select the Destination security from the dialog (this is the file that receives the data). This is usually the older data.

   Note: The source file will not remain highlighted after the destination security is selected.
4. Click **Merge**.

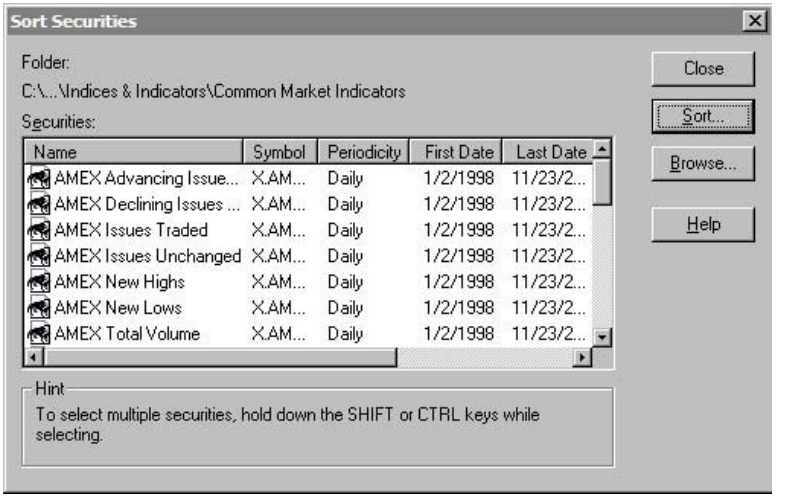
Sort

Clicking **Sort** sorts the entries either by Securities or Data. Select Securities if you want to sort the actual security files alphabetically. Select Data if you want to sort the price data in a security file chronologically.

Sort Securities

Use this command to alphabetize all or just the selected securities.

If fewer than two securities are selected, The DownLoader will ask if you want to "Sort all securities?" If multiple securities are selected, The DownLoader will ask if you want to "Sort selected securities?"



A block of securities can be selected by dragging the mouse over the desired securities.

Sort. Click **Sort** to sort either all or just the selected securities alphabetically. The selected securities must be a continuous block of securities.

Browse. Click **Browse** to display the Select Folder dialog (see page 666). Use the Select Folder dialog to change the data folder displayed in the dialog.

To alphabetize all securities

1. Select **Tools>** Sort> Securities.
2. Click **Sort**.
3. Click **Yes** to sort all securities in the menu alphabetically.

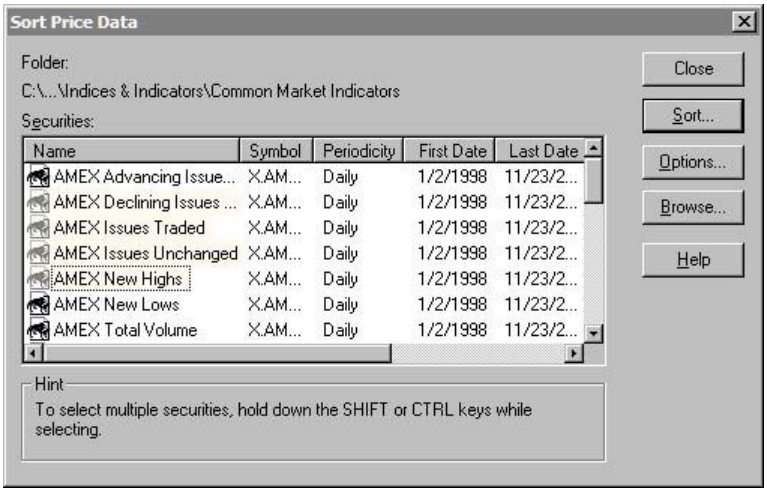
To alphabetize selected securities

1. Select **Tools>** Sort> Securities.
2. Select the securities you want to sort.

   Note: The selected securities *must* be in a continuous block.
3. Click **Sort**.
4. Click **Yes** to sort the selected block of securities alphabetically.

Sort Data

The Sort Data command is used to sort the price data for the selected security(s). The price data is sorted chronologically.

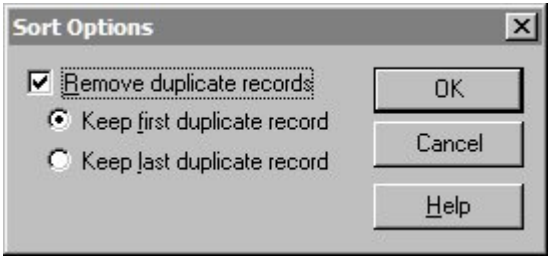


You can select multiple securities by holding down the CTRL or SHIFT key as you click.

Sort. Click **Sort** to sort the price data in the selected securities chronologically.

Browse. Click **Browse** to display the Select Folder dialog (see page 666). Use the Select Folder dialog to change the data folder displayed in the Sort Security Data dialog.

Options. Click **Options** to specify how to handle duplicate records (i.e., records with the same date or time).
Mark the Remove duplicate records box to remove either the first or last duplicate record (depending on your selection).



To sort price data chronologically

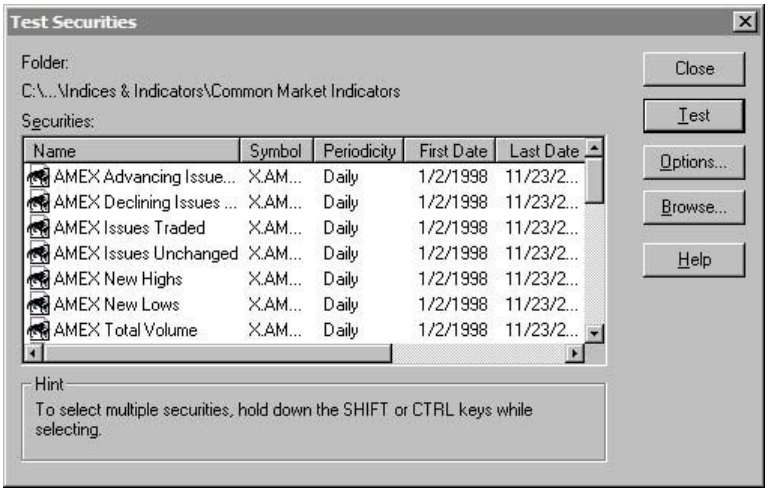
1. Select **Tools>** Sort> Data.
2. Select the securities you want to sort.
3. Click **Sort**.
4. Click **Yes** to sort the selected block of securities chronologically.

Test

Test Button

The Test command tests the security files for true MetaStock compatibility and to see if there are any other obvious errors (i.e., unusually large price changes, dates out-of-order, etc.). The DownLoader tests for over 100 different error conditions.

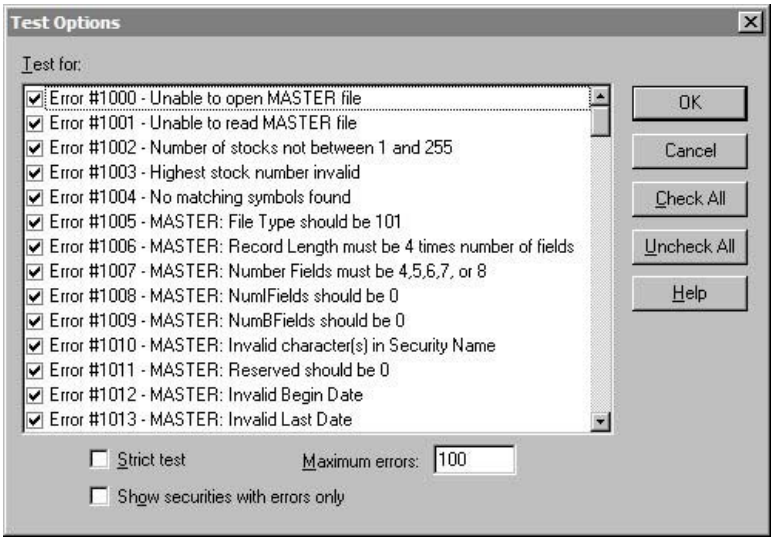
The testing process involves selecting the files to test, testing the files, and viewing the Error Report. We recommend that you test your security files on a regular basis to avoid costly errors.



Test. Click **Test** to start the testing process for the selected securities. While the test is being performed, the Test Status window appears (see page 724).

For a comprehensive list of test error messages, see page 739.

Options. Click **Options** to display the Test Options dialog.



Select the error message numbers that you wish to turn on in the "Test for:" list. The DownLoader will test only for these error conditions. For example, if you track very volatile securities and you would like to deselect Error #1091 ("large change in close"), click on that error and remove the check mark.

The MASTER and EMASTER files contain information on each security's attributes.

Mark the Strict test box to perform a more rigorous test on the securities. A Strict test checks for the standard error conditions as well as checking the reserved fields in the MASTER and EMASTER files.

Type the maximum number of errors you want to display in the report in the "Maximum error" box. When The DownLoader has found the number of errors you have entered, the testing process will stop and the Test Report will display.

Mark the "Show securities with errors only" box if you want a report of only those securities that actually have errors.

Browse. Click **Browse** to display the Select Folder dialog (see page 666). Use the Select Folder dialog to change the securities displayed in the Test Securities dialog.

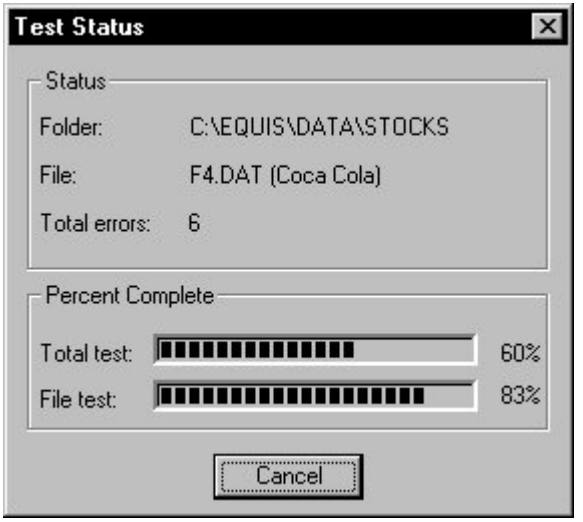
To test securities for errors

1. Select **Tools>** Test.
2. Click **Browse** to select the folder to test.
3. Select the securities you want to test from the Securities list. If you want to test *all* the securities, do not make any selections.
4. If desired, click **Options** to specify test options. This is optional.

5. Click **Test** to begin the test. After the test is complete, the Test Report will appear showing the test results.

Test Status Window

While the data is being tested, the Test Status window appears showing the data being tested and the percentage completed.



Status. The information in the Status section shows the data folder being tested, the file (i.e., security) being tested, and the total errors found.

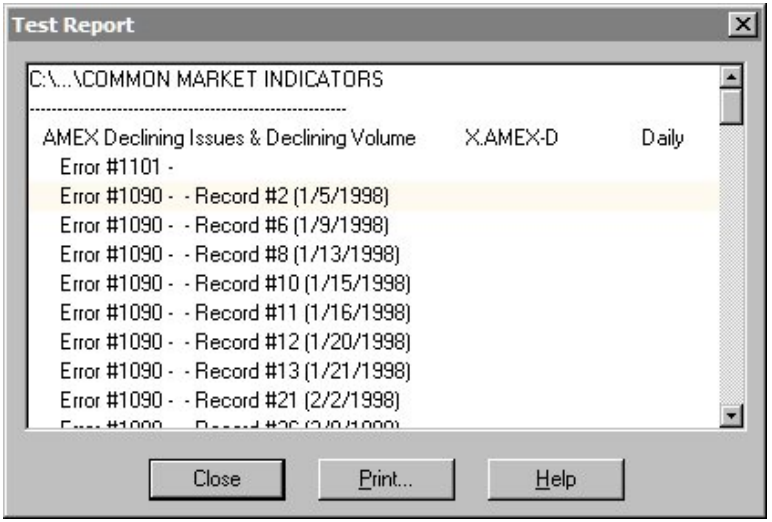
Percent Complete. The information in the Percent Complete section shows how much (in percent) of the total test and how much (in percent) of the file test have been completed.

Test Report

After a test is complete, the Test Report appears showing the results of the test. You can select any of the errors displayed in the report and click **Help** to display a description of the error message.

You can also edit or delete the securities in the Test Report. First, select the desired securities, and then right click on one of the highlighted securities. A menu appears for you to choose from.

For a complete listing of all test error messages, see page 739.



Application Options

The Application Options dialog is used to change properties of The DownLoader in general. This includes the display of the toolbar and status bar, dialing option, file locations, etc.

Datasheet

The Datasheet tab displays warning options available for datasheets.

Allow mixed case ticker symbols. Mark this box if you want The DownLoader to allow upper and lower case characters when adding or editing the ticker symbol in a datasheet. Mixed case symbols are required by some exchanges.

Date out of order. Mark this box if you want The DownLoader to warn you if you have entered a date that is not in chronological order.

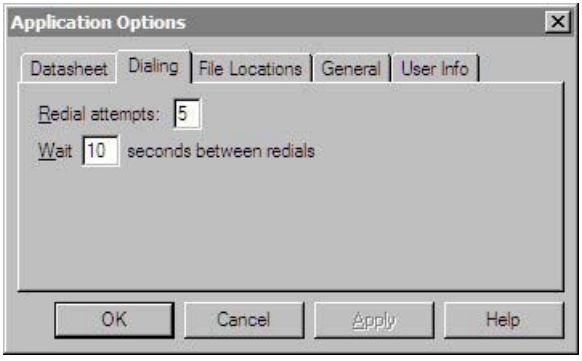
Time out of range. Mark this box if you want The DownLoader to warn you if you have entered a time that does not fall between the security's start and end times (see page 655).

Unusual H-L-C relationship. Mark this box if you want The DownLoader to warn you if you have entered an open, high, low, or closing price that does not fall within the normal high price/low price range. For example, entering a closing price of 50 after entering a high price of 49 would generate a warning.

Open Locked Security. Mark this box if you want The DownLoader to warn you if you have attempted to open a locked security file (see page 728).

Dialing

The Dialing tab displays options available for telephonic connection.

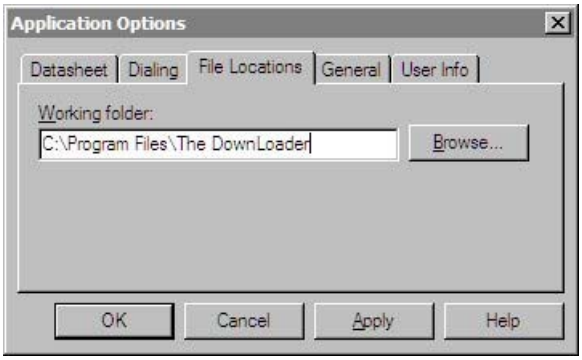


Redial attempts. Enter the number of times you want The DownLoader to automatically redial if the modem receives a busy signal.

Wait __ seconds between redials. Enter the number of seconds to wait between redial attempts.

File Locations

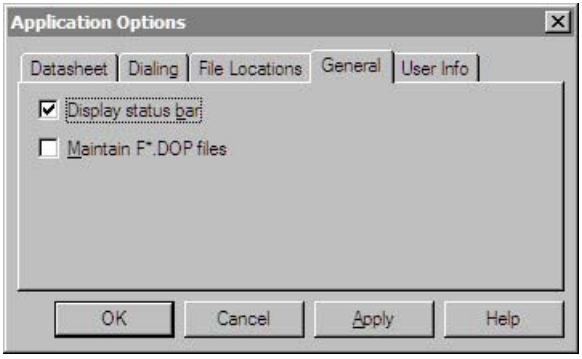
The File Locations tab lets you select where the working folder is to be located.



Working folder. The working folder is the folder in which your copy of The DownLoader is installed (e.g.,`c:\Program Files\equis\The DownLoader`). This is primarily intended to allow network users to have their own settings (i.e., selected securities list, log-on scripts, etc.) maintained in the specified folder on their individual workstation.

General

The General tab lets you control the display of the status bar, and controls the maintenance of F*DOP files.



Display status bar. Choose this option if you want to display the status bar (see page 690).

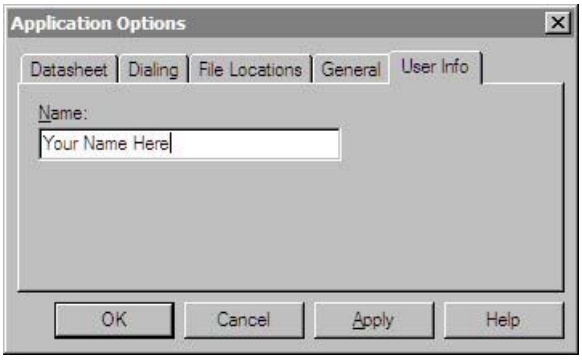
Maintain F*.DOP files. Deselect this option if you are using your security files exclusively with Equis International software (i.e., MetaStock or The DownLoader). There are a few third party software programs that require the F*.DOP files. Since F*.DOP files are not required by Equis International's software, not maintaining

them will reduce the amount of hard disk space the security files occupy.

Note: **Note:** This option only affects newly created security files. F*.DOP files for existing security files are not affected.

User Info

The User Info page lets you set what text is to be displayed as the user's name.

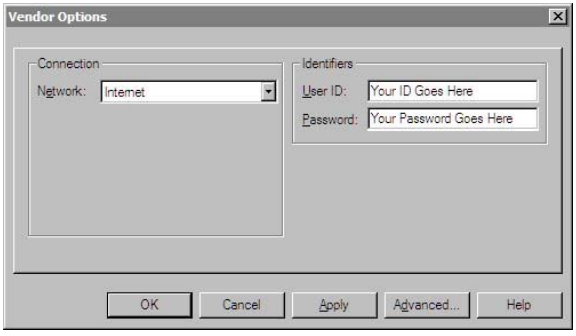


Name. Your name is used primarily for multi-user network control. If security files are shared among multiple users on a network, The DownLoader assigns locked security files to the name entered in this edit box. For example, if you have a datasheet of IBM open and another user on the network attempts to open the same IBM file, they will receive a message informing them that you have locked the file.

Note: **Note:** Changes made to the Name do not take effect until the next time you run The DownLoader.

Vendor Options

The Vendor Options dialog is used to configure the your data vendor feed.



Network. Choose your data vendor network connection.

Note: You must first establish a connection with your Internet dialer software before using The DownLoader to connect through the Internet. In other words, The DownLoader does not establish the *Internet* connection —this is your *Internet* dialer software's responsibility. Once the dialer has made a successful connection, then you can use The DownLoader to access your data vendor.

With the exception of the User ID/User Name and Password boxes, the controls in the Vendor Options dialog are disabled if you have chosen "Internet" for your network connection.

Number. Type the telephone number of the network you have been provided. If you are dialing from an office phone that requires a prefix to dial out, be sure to include the prefix in the Windows Dialing Properties dialog (see Windows help for details).

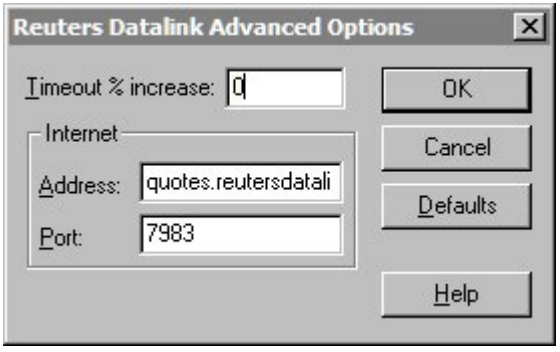
User ID/User Name. Enter the user name/ID provided to you by the QuoteCenter data vendor.

Password. If a password is required, type the password provided to you by QuoteCenter data vendor here.

Advanced. Click this button to display the Advanced Options. You can select the advanced configuration options with the dialog that appears.

Advanced Options

Click **Advanced** in the Configuration dialog to open the Advanced Options dialog. These options should not be changed unless instructed by a technical support representative.



Defaults. Click **Defaults** to reset the Advanced Options dialog's original configuration.

Ignore port errors. Select Ignore Port Errors if you do not want The DownLoader to report any communication error messages on the Security Report. See page 754 for a complete list of all Security Report messages, including those specific to communication errors.

A time-out occurs when The DownLoader has received no response from Reuters DataLink for a predetermined amount of time. After timing out, The DownLoader automatically logs off

Time-out % increase. Enter the percentage increase that you would like The DownLoader to wait before timing out. For example, if you enter `100`, The DownLoader will wait twice as long (i.e., a 100% increase) before timing out.

Address. This is normally only used by technical support for debugging purposes. Under normal conditions this should be left alone.

Port. This is normally only used by technical support for debugging purposes. Under normal conditions this should be left alone.

Adjust Menu

When a security splits or pays a distribution, the historical data for that security must be adjusted appropriately. The commands in the Adjust menu are used to make these adjustments to your data. This menu is only available when a datasheet is open. See page 699 for information on adjusting multiple securities simultaneously.

The Adjust menu commands are also available by right-clicking on the data pane(s) you want to change.

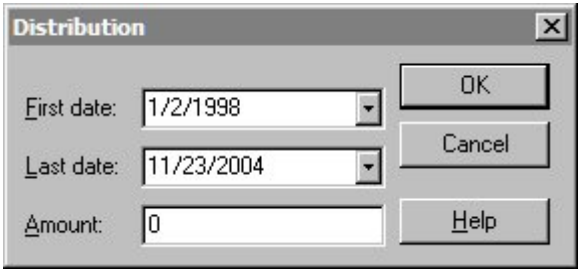
Distribution

The Distribution command adjusts the price data in the selected datasheet for a distribution. It is typically used following a mutual fund distribution.

Notes:

- The Distribution command cannot be selected if a composite is displayed in the datasheet.
- Composite price data cannot be edited or adjusted directly (see page 679).
- See page 699 for information on adjusting multiple securities simultaneously.

Caution: Please use caution when applying this command. Once a distribution adjustment is made, it may be difficult to bring the data back to its original state.



You are prompted to enter the range of data by typing the first and last dates to adjust.

First Date. This is almost always the first date in the datasheet or the first date in the selected data panes.

Last Date. This is the day before the security's price fell (and the day before the distribution was paid).

Amount. The default amount is automatically calculated based on the drop in the fund's price following the distribution.

When a mutual fund pays a distribution, its price is reduced to reflect the new value of the fund. The Distribution command reduces the security's prices, before the distribution, by the distribution/price ratio. The volume is left unchanged.

For example, XYZ fund sells for $14.31 on 10/1/93, pays a $0.75 distribution, and the price falls to $13.59 on 10/2/93.
Enter "*10/1/93*" for the last date to adjust and "*0.75*" for the amount. The DownLoader reduces all prices through 10/1/93 by 5.2419% (i.e., 0.75 / 14.31).

To adjust data for a distribution

1. Select **File>** Open (or select an open datasheet).
2. Choose the security to adjust. The datasheet will appear.
3. Select **Adjust>** Distribution.
4. Type the First Date and Last Date and the Amount of the distribution (e.g., 0.75). Remember, the First Date is the first date in the datasheet; the Last Date is the date before the security price fell.
5. Click **OK**.

To adjust data for a distribution using the right-click commands

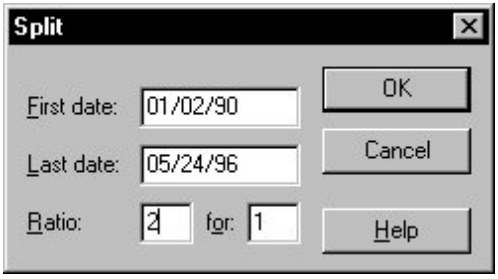
1. Select **File>** Open (or select an open datasheet).
2. Select the security to adjust. The datasheet will appear.
3. Select the desired date range to adjust.
4. Right-click on the selected area and select Distribution from the pop up menu. The command's dialog will appear displaying the selected date range.

Split

The Split command is used to adjust the price data and volume for a stock split. A company usually splits its stock (often 2 shares for 1) in order to decrease the price, thereby increasing its liquidity.

Notes:

- The Split command cannot be selected if a composite is displayed in the datasheet.
- Composite price data cannot be edited or adjusted directly (see page 679).
- See page 699 for information on adjusting multiple securities simultaneously.



Caution: Please use caution when applying this command. Once an adjustment is made, it may be difficult to bring the data back to its original state.

You are prompted to enter the range of data by typing the first and last dates to split.

First Date. This is almost always the first date in the datasheet or the first date in the selected data panes.

Last Date. This is the day before the security's price changed.

Ratio. The default split Ratio amount is automatically calculated based on the change in the security's price following the split (e.g., 2 for 1, 3 for 2, etc.).

Sometimes a stock will post a reverse split (e.g., one share for every two). This is typically done with very low-priced stocks to increase the perceived value.

When a stock splits, the historical prices must be adjusted to reflect the split. For example, if XYZ company has a 2 for 1 stock split, shareholders will receive two shares for each share that they own. To keep the total market value of the stock equal, the price per share is reduced by one-half. Therefore shareholders will have twice as many shares at half the price. Stock splits are usually done in order to increase the liquidity of the stock.

When price data is adjusted for a stock split, the volume is also affected. For example, in a 2 for 1 split where prices are cut in half, the volume is doubled so that the market value remains unchanged.

To adjust data for a split

1. Select **File>** Open (or select an open datasheet).
2. Select the security to adjust. The datasheet will appear.
3. Select **Adjust>** Split.
4. Type the First Date, Last Date and the Ratio of the split. Remember, the First Date is the first date in the datasheet; the Last Date is the day before the security prices changed.
5. Click **OK**.

To adjust data for a split using the right-click commands

1. Select **File>** Open (or select an open datasheet).
2. Select the security to adjust. The datasheet will appear.
3. Select the desired date range to adjust.
4. Right-click on the selected area and select Split from the pop up menu. The command's dialog will appear displaying the selected date range.

Manual

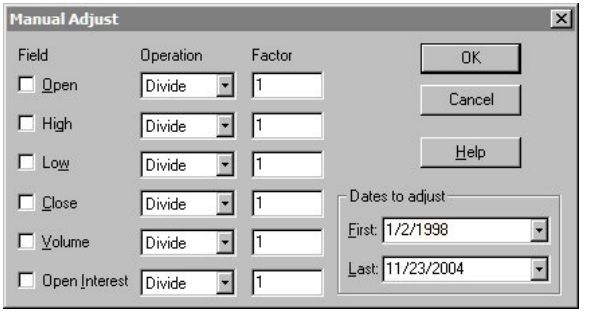
The Manual command is used to manually adjust the price data for the selected datasheet. Each data field for every record within the security file can be adjusted by using a combined operation and weighting factor. For example, you could multiply all the volume records in the security by 100 using the Manual command.

Notes:

- The Manual command cannot be selected if a composite is displayed in the datasheet.
- Composite price data cannot be edited or adjusted directly (see page 679).

- See page 699 for information on adjusting multiple securities simultaneously.

Caution: Please use caution when applying this command. Once adjustments are made, it may be difficult to bring the data back to its original state.



An Operation drop-down list box and a Factor box appear to the right of each of the data fields. These are used to specify adjustments to the individual data fields.

Operation. Choose the desired operator to use when adjusting the data field.

Factor. The Factor is the value by which the data field will be adjusted.

Dates to adjust. You are prompted to enter the range of data by typing the first and last dates to adjust. For example, if you needed to adjust all your old volume data, you would likely enter the first date in the file in the First date box, and the date before you switched in the Last date box.

To adjust the volume

1. Select **File>** Open (or select an open datasheet).
2. Select the security you wish to adjust. The datasheet will appear.
3. Select **Adjust>** Manual.
4. Mark the Volume box.
5. For the Volume data field, choose the multiplication or division Operation, depending on the type of adjustment needed.
6. Enter the value by which you want to adjust the volume in the Factor box. Leave the other fields at their default setting.
   For example, if you want to divide all the volume in the security file by 100, choose the division Operation and enter "*100*" for the Factor.

7. Enter the range of dates to adjust in the First date and Last date boxes.
8. Click **OK**.

To manually adjust data using the right-click commands

1. Select **File>** Open (or select an open datasheet).
2. Select the security to adjust. The datasheet will appear.
3. Select the desired date range to adjust.
4. Right-click on the selected area and select Manual from the popup menu. The command's dialog will appear, displaying the selected date range.

Window Menu

The commands in the **Window** menu operate in exactly the same way as the **Window** menu in MetaStock. See page 19 for details.

Open Datasheets

The bottom of the Window menu lists the names of each of the open datasheets. A check mark designates the currently selected datasheet.

To switch between open datasheets using the **Window** menu, click on the name of the desired datasheet. You can also switch between datasheets by simply clicking directly on the desired datasheet in The DownLoader workspace. The selected datasheet has a unique heading background color.

Help Menu

The commands in the **Help** menu operate in exactly the same way as those in the **Help** menu in MetaStock. See page 37 for details.

The DownLoader Messages

Convert Error Messages

The following are the most common convert error messages. If you receive a message that is not listed, contact technical support for more information. (See page 4 for contact information.)

2000. No date field present in data record

Each data record in the source file must have a date field.

2001. No numeric data fields in data record

No valid data was found for the high, low, close, etc.

2002. Blank line encountered

A blank line exists in the source file.

2003. Fewer destination than source files specified

This will occur if you've chosen multiple source files and only one destination file.

2053. Unable to start new destination file

The destination file could not be opened or created because of some type of disk error.

2054. Unrecognized field in header string

The header string at the front of the ASCII file is unrecognized. Valid strings include <ticker>, <name>, <date>, <dtyymmdd>, <time>, <open>, <o/i>, <openint>, <high>, <low>, <close>, <volume>, <split>, and <dist>.

2055. Ticker field present without corresponding periodicity field

If the ticker field is present in the source file, the periodicity must also be present.

2056. Invalid source file format

The file format of the selected source file(s) does not match the selected file type.

2069. Unable to retrieve security information

During a MetaStock conversion, the security information (e.g., ticker, name, periodicity, etc.) was not properly received.

2070. No data exists for this security within the specified range

The data range specified for the source file does not exist.

2071. Unrecognized cell type, cell discarded

A cell in the Excel spreadsheet file is not properly formatted for the conversion.

2072. Invalid file type, file not converted

The specified file is not a valid Excel file type.

2073. Unable to retrieve row and column information

The row and column information in the Excel spreadsheet could not be retrieved due to some type of corruption.

2074. Invalid cell, unable to convert numeric value

The row and column information in the Excel spreadsheet could not be retrieved due to some type of corruption.

Data Error Messages

The following are the most common data error messages. If you receive a message that is not listed, contact technical support for more information. (See page 4 for contact information.).

Add or change would duplicate an existing security

Adding or editing the security will cause a duplication (i.e., matching ticker, periodicity, and interval) of another security in the current data folder.

Folder is locked by another user

The data folder cannot be accessed because it is in use by another user.

Duplicate securities in data folder

The current data folder contains duplicate securities (i.e., matching ticker, periodicity, and interval). Clicking **Yes** will automatically merge the data of the duplicate securities.

Price data not in sorted date/time order

The price data is not chronologically sorted. Use the Sort command in the **Tools** menu to sort the data (see page 719).

Security already being accessed by [User Name] running [Application Name]

The security is being used by the user and application (see page 728) specified in the message. For example, this message will appear if you attempt to copy, delete, etc., a datasheet that has already been opened...

This folder is already in use by...

The current data folder is being used by someone with the same application and User Name (see page 728). Clicking **Yes** allows you to continue using this data folder. If someone else is using the folder, s/he will be unable to access the data.

Unable to delete, security has linked composites

This security is contained in one or more composites. Clicking **Yes** will delete the composites.

Possible Error Conditions

Test Error Messages

The following is a complete list of the possible error conditions that The DownLoader's Test command checks for (see page 722) .

Errors #1000–1009

Error #1000. "Unable to open MASTER file."

A MASTER file exists, but it cannot be opened. It may be corrupt or already opened by another program.

Error #1001. "Unable to read MASTER file."

The MASTER file is corrupt or invalid and cannot be read.

Error #1002. "Number of stocks not between 1 and 255."

Your data folder must have between 1 and 255 securities.

Error #1003. "Highest stock number invalid."

The Master file DAT number is higher than 255.

Error #1004. "No matching symbols found."

The ticker symbol specified to test was not found in the data folder.

Error #1005. "MASTER: File type should be 101."

A field in the MASTER called "File type" should be set to 101.

Error #1006. "MASTER: Record length must be four times number of fields.

The number of fields in the security multiplied by four bytes should equal the total number of bytes in the record. If it doesn't, a programmer has made a mathematical mistake or the MASTER file has been damaged.

Error #1007. "MASTER: Number fields must be 4, 5, 6, 7, or 8."

The number of data fields specified in the MASTER file must be 4, 5, 6, 7, or 8.

Error #1008. "MASTER: NumIFields should be 0"

There is an unused field that should be set to zero.

Error #1009. "MASTER: NumBFields should be 0"

There is an unused field that should be set to zero.

Errors #1010–1019

Error #1010. "MASTER: Invalid character(s) in Security Name"

A character other than a normal alphanumeric character is stored where the security name should be.

Error #1011. "MASTER: Reserved should be 0"

There is an unused field that should be set to zero.

Error #1012. "MASTER: Invalid Begin Date"

The beginning date in the MASTER record does not adhere to a valid date format.

Error #1013. "MASTER: Invalid Last Date"

The ending date in the MASTER record does not adhere to a valid date format.

Error #1014. "MASTER: Periodicity must be I,D,W, or M"

The periodicity in the MASTER record is not intraday (I), daily (D), weekly (W), or monthly (M).

Error #1015. "MASTER: Intraday Interval must be between 0 and 60"

The interval for the intraday security must be between 0 and 60 minutes.

Error #1016. "MASTER: Invalid character(s) in Symbol"

A character other than a normal alphanumeric character is stored where the ticker symbol should be.

Error #1017. "MASTER: UserDef should be a space(' ')"

There is an unused field that should contain a space character.

Error #1018. "MASTER: Flag must be '*' or '<space>'"

A special field in the MASTER file is reserved for flagging securities for charting or updating. Only "*" and space characters are allowed in this field.

Error #1019. "MASTER: cDummy should be NULL"

There is an unused field that should contain a NULL character.

Errors #1020–1029

Error #1020. "No EMASTER file exists"

An EMASTER file does not exist in the data folder.

Error #1021. "Unable to open EMASTER file"

An EMASTER file exists, but it cannot be opened. It may be corrupt or already opened by another program.

Error #1022. "Unable to read EMASTER file"

The MASTER file cannot be read because it is corrupt.

Error #1023. "EMASTER Number of stocks invalid"

The total number of stocks in the folder is greater than 255.

Error #1024. "EMASTER Highest Stock Num invalid"

The highest DAT number is greater than 255.

Error #1025. "Unsynched MASTERs, run MS or DL 3.0+"

EMASTER and MASTER files don't agree on the number of securities in the folder.

Error #1026. "EMASTER: Version Number invalid"

The version number reported in the header of the EMASTER file is not valid.

Error #1027. "EMASTER: DAT File Number invalid"

The highest DAT number reported by the EMASTER file is greater than 255.

Error #1028. "EMASTER: Security type should be 0"

EMASTER security type must always be zero. No others are supported.

Error #1029. "EMASTER: Invalid Number Of Fields"

The number of data fields specified in the EMASTER file must be 4, 5, 6, 7, or 8.

Errors #1030–1039

Error #1030. "EMASTER: Data Fields must be 0"

EMASTER data fields should always be zero.

Error #1031. "EMASTER: Flag must be '*' or '<space>'"

A special field in the EMASTER file is reserved for flagging securities for charting or updating. Only "*" and space characters are allowed in this field.

Error #1032. "EMASTER: Vendor Code should be NULL"

There is an unused field that should be set to NULL.

Error #1033. "EMASTER: Invalid character(s) in EMASTER ticker"

A character other than a normal alphanumeric character is stored where the ticker symbol should be.

Error #1034. "EMASTER: Reserved1 should be NULL"

There is unused field that should be set to NULL.

Error #1035. "EMASTER: Invalid character(s) in EMASTER name"

A character other than a normal alphanumeric character is stored where the name should be.

Error #1036. "EMASTER: Reserved2 should be NULL"

There is an unused field that should be set to NULL.

Error #1037. "EMASTER: Exchange code should be 0"

There is an unused field that should be set to zero.

Error #1038. "EMASTER: Periodicity must be I,D,W, or M"

The periodicity in the EMASTER record is not intraday (I), daily (D), weekly (W), or monthly (M).

Error #1039. "EMASTER: Reserved3 should be NULL"

There is an unused field that should be set to NULL.

Errors #1040–1049

Error #1040. "EMASTER: Interval not 0 to 60"

The interval for the intraday security must be between 0 and 60 minutes.

Error #1041. "EMASTER: Invalid First Date in EMASTER"

The beginning date in the EMASTER record does not adhere to a valid date format.

Error #1042. "EMASTER: Invalid First Time"

The beginning time in the EMASTER record does not adhere to a valid time format.

Error #1043. "EMASTER: Invalid Last Date in EMASTER"

The ending date in the MASTER record does not adhere to a valid date format.

Error #1044. "EMASTER: Invalid Last Time"

The ending time in the EMASTER record does not adhere to a valid time format.

Error #1045. "EMASTER: Invalid Start Trade Time"

The start time in the EMASTER record does not adhere to a valid time format.

Error #1046. "EMASTER: Invalid End Trade Time"

The ending trade time in the EMASTER record does not adhere to a valid time format.

Error #1047. "EMASTER: Invalid character(s) in composite ticker"

A character other than a normal alphanumeric character is stored where the composite ticker should be.

Error #1048. "EMASTER: Reserved4 should be NULL"

There is an unused field (“Reserved4” in this example) that should be set to NULL.

Error #1049. "EMASTER: Composite Operator must be -,+,*, or *"

A character other than a -,+,/, or * exists in the operator field in the EMASTER record.

Errors #1050–1059

Error #1050. "EMASTER: Reserved5 should be NULL"

There is an unused field that should be set to NULL.

Error #1051. "EMASTER: Composite Factor 1 invalid"

The value for the symbol #1 factor in the composite security is invalid.

Error #1052. "EMASTER: Composite Factor 2 invalid"

The value for the symbol #2 factor in the composite security is invalid.

Error #1053. "EMASTER: Composite DAT Number 1 invalid"

The DAT number for security #1 is greater than 16,000.

Error #1054. "EMASTER: Composite DAT Number 2 invalid"

The DAT number for security #2 is greater than 16,000.

Error #1055. "EMASTER: Reserved6 should be NULL"

There is an unused field that should be set to NULL.

Error #1056. "DAT File number doesn't match"

The DAT file number recorded in the MASTER file for one (or both) of the securities in the composite does not match the security file's DAT number.

Error #1057. "Num Fields doesn't match"

The number of fields specified for the security in the MASTER and EMASTER records are not the same.

Error #1058. "Flag doesn't match"

The flagged field for the security in the MASTER and EMASTER records are not the same.

Error #1059. "Ticker doesn't match"

The ticker symbols for the security in the MASTER and EMASTER records are not the same.

Errors #1060–1069

Error #1060. "Security Name doesn't match"

The security names for the security in the MASTER and EMASTER records are not the same.

Error #1061. "Periodicity doesn't match"

The periodicities for the security in the MASTER and EMASTER records are not the same.

Error #1062. "Intraday Interval doesn't match"

The intraday intervals for the security in the MASTER and EMASTER records are not the same.

Error #1063. "First Date doesn't match"

The first date for the security in the MASTER and EMASTER records are not the same.

Error #1064. "Duplicate DAT File Number"

The securities in the composite have the same DAT file numbers.

Error #1065. "No match for first ticker in composite"

The ticker symbol for the first security in the composite is not found in the data folder.

Error #1066. "Multiple matches for first ticker in composite"

A duplicate security exists with the same ticker symbol, periodicity, and interval as the first security in the composite exists.

Error #1067. "No match for second ticker in composite"

The ticker symbol for the second security in the composite is not found in the data folder.

Error #1068. "Multiple matches for second ticker in composite"

A duplicate security exists with the same ticker symbol, periodicity, and interval as the first security in the composite exists.

Error #1069. "Composite DAT #1 doesn't match security DAT #1"

The DAT number recorded in the MASTER file for the first security in the composite does not match the security's DAT number.

Errors #1070–1079

Error #1070. "Composite DAT #2 doesn't match security DAT #2"

The DAT number recorded in the MASTER file for the second security in the composite does not match the security's DAT number.

Error #1071. "User canceled test"

The Cancel button was pressed during the test. The security was not tested to completion.

Error #1072. "No MASTER file exists"

There is no MASTER file in the data sub-folders.

Error #1073. "Composite flags don't match"

The composite flag fields for the security in the MASTER and EMASTER records are not the same.

Error #1074. "Duplicate Security, previously found in EMASTER"

A security with the same ticker symbol, periodicity, and intraday interval already exists in the data folder.

Error #1075. "Not enough memory for EMASTER test"

The DownLoader was unable to find enough memory to test the EMASTER file.

Error #1076. "Unable to seek EMASTER record."

There is a serious data file structure problem or disk failure.

Error #1077. "Unable to read DAT file"

The security's DAT file is corrupt or invalid and cannot be read.

Error #1078. "File is 'pre-formatted' rather than 'dynamic'"

The file has been set up to be pre-formatted, which means it can only store a predetermined amount of data.

Errors #1080–1089

Error #1079. "DAT file has more records than originally allowed"

This message occurs when a pre-formatted file (Error #1079) has more records than were originally allowed. The program that created this file should not have let this occur. The file should have been either extended or set up to be dynamic.

Error #1080. "No records in DAT file"

This is a warning more than an error. The message occurs if the DAT file contains no records.

Error #1081. "Maximum records shows less than zero"

An invalid value was written in this field. This error will not affect Equis software. However, third party software may be adversely affected.

Error #1082. "DAT file not found"

This happens if you deleted a DAT file from DOS rather than from within The DownLoader or MetaStock.

Error #1083. "Unable to open DAT file"

A DAT file for the security exists, but it cannot be opened. It may be corrupt or already opened by another program.

Error #1084. "Invalid date"

An invalid date exists in the DAT file.

Error #1085. "Begin date differs from MASTER"

The beginning date in the security's DAT file is different than the beginning date in the MASTER file record.

Error #1086. "Last date differs from MASTER"

The last date in the security's DAT file is different than the last date in the MASTER file record.

Error #1087. "Dates out of order"

One or more dates in the security's DAT file are not in chronological order. Use the Sort command to correct the problem (see page 719).

Error #1088. "Invalid time"

One or more times in the intraday security's DAT file are not valid.

Errors #1090–1099

Error #1089. "Times out of order"

One or more times in the security's DAT file are not in chronological order. Use the Sort command to correct the problem (see page 719).

Error #1090. "Large change in close"

This is a warning that the file contains a closing price that changed more than 20% from the previous record. This message is automatically suppressed for securities priced less than $110.

Error #1091. "High less than close"

The file contains a high price that is less than the close.

Error #1092. "Low greater than close"

The file contains a low price that is greater than the close.

Error #1093. "Close equal to zero"

The file contains a closing price equal to zero.

Error #1094. "Volume less than zero"

The file contains a volume that is less than zero.

Error #1095. "DOP file not found"

This happens if you deleted a DOP file from DOS rather than from within The DownLoader or MetaStock.

Error #1096. "Unused portion of DAT control record should be NULL"

There is an unused field that should be set to NULL.

Error #1097. "MASTER reports no securities in folder to test"

The data folder may be empty or the folder was initialized with an empty MASTER file.

Error #1098. "This is a folder label – not a file"

Some "MetaStock-compatible" programs permit folder names to be stored with the security names. MetaStock and The DownLoader will simply ignore the name of the folder in the MASTER file.

Errors #1100–1109

Error #1099. "EMASTER: Invalid collection date"

The Collection Date specified in the datasheet is invalid.
(See page 702 for instructions on correcting the date.)

Error #1100. "Open outside of High-Low range"

The open price for the specified record is either greater than the high price or less than the low price.

Error #1101. "Last date more than 31 days ago"

The security has not been updated in the last 31 days.

Error #1102. "Unable to open XMASTER file"

An EMASTER file exists, but it cannot be opened. It may be corrupt or already opened by another program.

Error #1103. "Unable to seek XMASTER record"

There is a serious data file structure problem or disk failure.

Error #1104. "Unable to read XMASTER file"

The MASTER file cannot be read because it is corrupt.

Error #1105. "XMASTER: Number of stocks invalid"

Your data folder must have between 1 and 2000 securities.

Error #1106. "XMASTER: Not enough Memory for XMASTER test"

The XMASTER file cannot be read because there is not enough RAM available.

Error #1107. "XMASTER: Invalid record type"

The XMASTER file has a record whose type is not recognized.

Errors #1110–1119

Error #1108. "XMASTER: Invalid character(s) in symbol"

A character other than a normal alphanumeric character is stored where the symbol should be.

Error #1109. "XMASTER: Invalid characters(s) in name"

A character other than a normal alphanumeric character is stored where the name should be.

Error #1110. "XMASTER: Unused1 should be NULL"

There is an unused field that should be set to NULL.

Error #1111. "XMASTER: Periodicity must be I, D, W, or M"

The periodicity in the XMASTER record is not intraday (I), daily (D), weekly (W), or monthly (M).

Error #1112. "XMASTER: Interval not between 0 and 60"

The interval for the intraday security must be between 0 and 60 minutes.

Error #1113. "XMASTER: Invalid DAT file number"

The highest DAT number reported by the XMASTER file is greater than 2000.

Error #1114. "XMASTER: Invalid display units"

Valid display units for decimals include ½, ¼, 1/8, 1/16, 1/32, 1/64, and 1/128.

Error #1115. "XMASTER: Invalid character(s) in composite symbol"

A character other than a normal alphanumeric character is stored where the composite ticker should be.

Error #1116. "XMASTER: Invalid composite operator"

The operator (+,-,*, /, etc.) used in the composite is invalid.

Error #1117. "XMASTER: Composite Factor 1 invalid"

The value for the symbol #1 factor in the composite security is invalid.

Errors #1120–1129

Error #1118. "XMASTER: Composite Factor 2 invalid"

The value for the symbol #2 factor in the composite security is invalid.

Error #1119. "XMASTER: Composite DAT Number 1 invalid"

The DAT number for security #1 is greater than 16,000.

Error #1120. "XMASTER: Composite DAT Number 2 invalid"

The DAT number for security #2 is greater than 16,000.

Error #1121. "XMASTER: Invalid collection date

A character other than a -,+,/, or * exists in the operator field in the EMASTER record.

Error #1122. "XMASTER: Invalid First Date"

The beginning date in the XMASTER record does not adhere to a valid date format.

Error #1123. "XMASTER: Invalid First Time"

The beginning time in the XMASTER record does not adhere to a valid time format.

Error #1124. "XMASTER: Invalid Last Date"

The ending date in the XMASTER record does not adhere to a valid date format.

Error #1125. "XMASTER: Invalid Last Time"

The ending time in the XMASTER record does not adhere to a valid time format.

Error #1126. "XMASTER: Invalid Start Trade Time"

The start time in the XMASTER record does not adhere to a valid time format.

Error #1127. "XMASTER: Invalid End Trade Time"

The ending trade time in the XMASTER record does not adhere to a valid time format.

Errors #1130–1139

Error #1128. "XMASTER: Invalid adjustment date"

An invalid date exists in the field where the last adjustment date is stored.

Error #1129. "XMASTER: Invalid composite field"

The composite field (which determines whether the security is a composite or not) is invalid.

Error #1130. "XMASTER: Invalid flagged field"

This field was used by the DOS versions of MetaStock to store a special character for use by the Autorun feature. An invalid character is in this field.

Error #1131. "XMASTER: Record marked as deleted"

The security is marked as being deleted. However, it still exists.

Error #1132. "XMASTER: Invalid file ID"

A unique file identification field is corrupt.

Error #1133. "XMASTER: Invalid version"

The version of the XMASTER file is not recognized.

Error #1134. "XMASTER: Invalid serial number"

The serial number does not match the other security files in the folder.

Error #1135. "XMASTER: Invalid number of security records"

There are more than 2000 securities in the folder.

Error #1136. "XMASTER: Duplicate MWD file number"

A security with a MWD file extension must be assigned a unique MWD number. A duplicate exists for this security.

Error #1137. "MWD file not found"

This happens if you deleted a MWD file from outside of The DownLoader. The XMASTER file still has record of the MWD file existing.

Error #1138. "First date differs from XMASTER"

The first date field in the MWD file does not match the XMASTER's.

Error #1139. "Last date differs from XMASTER"

The last date field in the MWD file does not match the XMASTER's.

Errors #1140–1141

Error #1140. "Unable to write to data file"

The DownLoader could not write data to the DATA.DAT temporary storage file.

Error #1141. "—Maximum errors reached, remaining securities not completed"

The maximum number of permitted errors has been reached; all securities examined after this point have not been tested.

Program Error Messages

The following is an explanation of the various program error messages that can appear in The DownLoader.

A critical DDE error has occurred.

The DownLoader encountered problems allocating memory or couldn't establish a conversation with the data server.

Delete selected securities?

The DownLoader asks you for confirmation before actually deleting securities.

Do you want to cancel the testing?

You clicked **Cancel** while testing your data.

Error allocating memory to print.

The DownLoader was not able to find enough memory (i.e., RAM) to print the information.

Error initializing DDE.

The DownLoader could not establish a DDE link. The most likely cause is an internal error in the DDE management library.

Error writing to report. Cancel test?

The DownLoader encountered an error when writing the Test Report. The most likely cause is full disk.

MASTER file out of sync with EMASTER.

The MASTER and EMASTER files do not contain the same number of security files. The most likely cause is that a program not compatible with MetaStock was used to add or delete securities.

Printer error.

The printer is not accepting commands from The DownLoader. The most likely cause is that the printer is off-line or not turned on.

Selected securities must be in a continuous block.

In order to sort, the selected block of securities must be continuous (i.e., adjacent to each other).

The update session was aborted. Do you want to parse the received data?

If you abort a data collection before it is completed, The DownLoader will ask if you want to parse (i.e., store to your files) the data that was received up to that point.

Unable to delete 'n' MASTER records.

After you answered "Yes" to the question "Would you like to delete?," The DownLoader encountered a problem deleting records from the MASTER file.

Unable to execute QCENTER.EXE program.

The DownLoader could not run QuoteCenter. The most likely cause is that the file, qcenter.exe, is not in the same folder as The DownLoader.

Would you like to delete?

The DownLoader encountered extra DAT files in the data folder or in the MASTER file. You are asked if you want to delete them.

Security Collection Report Messages

The following is an explanation of the status messages that can be displayed in the Security Collection Report from The DownLoader (see page 697).

Note: It is possible that The DownLoader may incorrectly report the status of a security if you have a poor internet connection. For example, a security with a valid ticker symbol may be reported as "invalid" by the data vendor if the ticker symbol is altered because of a poor telephone connection.

Carrier Lost During Log-on

The DownLoader cannot find a carrier signal from the modem or the carrier was lost during connection to the network or data vendor.

Collection Aborted

The security was requested but not stored.

Collection Aborted - Bad Header

The ticker symbol sent to The DownLoader doesn't match the ticker symbol expected.

Collection Aborted - Carrier Lost

Data was requested but did not collect because the carrier signal was lost during data collection.

Collection Aborted - Checksum Error

Data was requested but did not collect because the data file checksum value was incorrect.

Collection Aborted - CUSIP Required

Data was requested but did not collect because the instrument's CUISP (Committee on Uniform Securities Identification Procedures) value was missing.

Collection Aborted - Data Error

Data was requested but did not collect because the data was corrupt or incorrect.

Collection Aborted - Database Closed

Cannot access the QuoteCenter data vendor database because it is closed.

Collection Aborted - Disk Error

Disk was probably full and no more data could be written to `DATA.DAT` temporary storage file.

Collection Aborted - Time-out Error

A time-out caused The DownLoader to stop trying to collect data for the security.

Collection Aborted - User Break

The Cancel button was pressed during collection.

Connected To Host, Not Requested

A tagged security was never requested.

Data Not Available

No data is available for the security as requested. This includes the periodicity of the security (i.e., the symbol may be valid, but monthly data is unavailable.)

Date Out Of Range

The first date of data to collect is in the future.

File Transfer Error

An error occurred while retrieving a data file from the data vendor host computer.

Host Connection Failed

The DownLoader made it through the network but didn't get to the host (i.e., the QuoteCenter data vendor).

Invalid Symbol

There is an invalid symbol in the data request.

Network Log-on Failed

The DownLoader was unable to log on to the network.

***NNNN* Collected**

All data was collected and stored.

***NNNN* Collected *NNNN* Rejected**

All data collected was not stored and no other status messages applied.

***NNNN* Collected *NNNN* Rejected Split Reported**

All data collected was not stored. The QuoteCenter data vendor reported a split or distribution for the security.

***NNNN* Collected Split Reported**

All data was collected and stored. The QuoteCenter data vendor reported a split or distribution for the security.

No Answer/Line Busy

The DownLoader cannot connect with the remote modem.

No Data Received

The security was requested, but no data was sent.

No Telephony Devices Configured

A TAPI-compliant modem was not detected in this computer.

Not Permissioned/Entitled for Symbol

This workstation does not have the permissions or entitlements for the data requested by The DownLoader.

Not Requested - Invalid Date

The first date of data to collect is invalid or in the future.

Not Requested - Date Out Of Range

The first date of data to collect is in the future. This will also be seen if the security's data is up-to-date yet the user still attempts to collect on it.

Not Requested - Missing Parenthesis

'(' is in the ticker symbol but was not closed with ')'.

Not Traded

No data was received for the security, and the current quote shows no trade.

Not Requested - No Symbol

The ticker symbol field is blank.

Not Requested - Invalid Symbol

The DownLoader determined before going online that the ticker symbol has invalid characters or is formatted incorrectly.

Overlapping Date

All data was rejected by the parser because of overlapping dates.

Parse Aborted - User Break

The parsing process was aborted or terminated.

Password Failure

The password was rejected by the QuoteCenter data vendor.

Too Much Data Requested

The data request is too large for the host computer to return data. Make the request smaller and try again.

Unable To Initialize Modem/Receiver

The DownLoader can't find the modem or the modem’s response is not the same as entered in Modem Configuration. With script networks, this can occur if The DownLoader can't get the communication settings from the script file.

Unable To Open Com port

The specified com port cannot be accessed. The com port may be in use by another program, or you may have specified the wrong com port in the Vendor Options dialog.

Unrecognized Host Error Message

The host computer returned an error that The DownLoader can’t understand.

User Break During Log-on

The ESC key on the keyboard was pressed during the network/host log-on.

Appendix

Error Messages and Warnings

The following are the most common data error messages. If you receive a message that is not listed, contact Equis International Technical Support for more information (see page 4).

Add or change would duplicate an existing security

- Adding or editing the security will cause a duplication (i.e., matching ticker, periodicity, and interval) of another security in the current data folder.

Duplicate securities in data folder

- The current data folder contains duplicate securities (i.e., matching ticker, periodicity, and interval). Choosing **Yes** will automatically *merge* the data of the duplicate securities.

Folder is locked by another user

- The data folder cannot be accessed because it is in use by another user.

Price data not in sorted date/time order

- The pricing data is not chronologically sorted. Use **Tools>** Sort in The DownLoader to sort the data.

Security already being accessed by [User Name] running [Application Name]

- The current data folder is being used by someone with the same application and User Name (see page 41). Choosing **Yes** allows you to continue using this data folder. If someone else is using the folder, s/he will be unable to access the data.
- The security is being used by the user and application (see page 41) specified in the message.
- You are already accessing the data in this folder. For example, this message will appear if you attempt to copy, delete, etc. a datasheet that has already been opened.

Security data unavailable

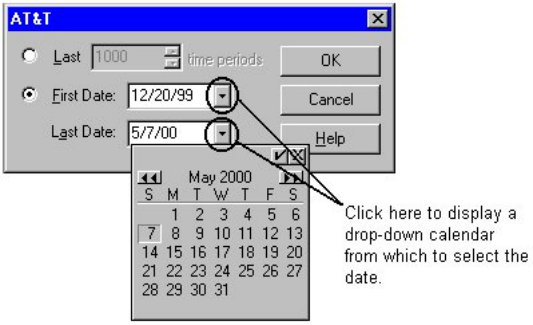
- The security you are requesting is not available. If you are requesting a futures contract, that monthly contract may not be available for that future.

Unable to delete, security has linked composites

- This security is contained in one or more composites. Choosing **Yes** will delete the composites.

Entering Dates in MetaStock

When entering dates in MetaStock, you can type them or use a special drop-down calendar that allows you to easily choose specific dates.



If you choose to type the dates rather than select them from the drop-down calendar, you can enter the year using two or four digits. If you enter only two digits, MetaStock interprets the two digit years 26 through 99 to mean 1926 through 1999. The two-digit years 00 through 25 are interpreted to mean 2000 through 2025. This means that in order to enter a date of 1915 or 2036, you would need to type in the four digit year, or MetaStock would not interpret them as you intended.

Converting Custom Formulas, System Tests, Explorations, and Experts

When you installed MetaStock for the first time, the installation program asked if you wanted to transfer your custom indicators, system tests, and explorations from a previous version of MetaStock. If you answered "yes," you will be asked if you want to update your files to be compatible with MetaStock. You are asked this the first time you attempt to access the Indicator Builder, Enhanced System Tester, The Explorer, or the Expert Advisor.

In this list, the # symbol represents a number equivalent to the MetaStock version installed. Example:`MS10FORM.DTA`

Also — if you have deleted, moved, or renamed the files `MS##FORM.DTA`, `MS##PRFT.DTA`, `MS##EXPL.DTA`, or `MS##EXPT.DTA`, you will be asked if you want to create new files. The actual formulas, system tests, explorations, and experts (respectively) are stored in these files.

Program Performance

There are several things you can do to speed up MetaStock:

- Close other applications while running MetaStock.
- Only load as much data as you need (see page 71).
- Limit the number of charts you have open.
- Use the status bar (see page 33) to view the date and pointer location rather than the Data Window.
- Increase the amount of RAM in your computer.
- Install a faster CPU.
- Limit the number of calculation-intensive indicators and experts attached to a chart.

Information About Your Computer System

Information about your computer system is available from the About MetaStock dialog. Select **Help>** About MetaStock to open it.

If you have Microsoft Office installed you can click the **System Info** button in this dialog to view information about your PC.

Using OptionScope

OptionScope button

OptionScope is a separate program provided with MetaStock that is patterned after a spreadsheet. It is used to analyze options on futures and equities.

You run OptionScope from within MetaStock by choosing OptionScope from the Tools menu or by clicking the OptionScope button on the standard toolbar.

With OptionScope you can:

- calculate the fair market value of put and call options.
- calculate implied volatility to see what the "actual" option's price is implying the volatility should be.
- calculate delta, vega, gamma, and theta (page 363) to study the sensitivity of the option to changes in market conditions.
- calculate "what-if" scenarios.
- display graphs of option positions.

The folder where the OptionScope program is located is specified in the Application Properties dialog (page 41).

OptionScope includes an on-line help system that explains how to use the program's features. Choose Contents from OptionScope's Help menu.

Suggested Reading

The following books have been used by Equis for the chapter *Interpretation of Indicators and Line Studies* in this manual. Equis also recommends these books to those needing additional information on technical analysis. They are listed in order by the author's last name.

For additional information on books, videos, software and other educational materials, check out the **EQUISDirect** catalog on our web site at: http://www.equis.com.

Achelis, Steven B. *Technical Analysis from A to Z.* Chicago, IL: Probus Publishing Company, 1995.

Written by the founder of Equis International. This book contains an introduction to technical analysis, plus a complete reference to over 100 indicators and studies.

Appel, Gerald and Hitschler, Fred. *Stock Market Trading Systems*. Homewood, IL: Dow Jones-Irwin, 1980.

Takes a thorough look at moving average trading systems, timing market cycles, the 12-day Rate-Of-Change, etc.

Appel, Gerald. *The Moving Average Convergence-Divergence Method*. Great Neck, NY: Signalert, 1979.

The MACD from its creator.

Arms, Richard W., Jr. *Volume Cycles in the Stock Market.* Salt Lake City, UT: Equis International, Inc., 1994.

Thoroughly explains the Equivolume charting method, volume cycles, and the ease of movement indicator.

Bookstaber, Richard. *The Complete Investment Book.* Glenview, Illinois: Scott, Foresman and Company, 1985.

Explains the Black/Scholes option calculations used in MetaStock.

Chande, Tushar S and Stanley Kroll. *The New Technical Trader*. New York: Wiley, 1994.

A book describing a new statistically- based breed of price-based, and risk control indicators.

Cohen, A.W. *How To Use The Three-Point Reversal Method of Point and Figure Stock Market Trading*. Larchmont, NU: Chartcraft, 1984.

A detailed book on Point and Figure chart interpretation.

Dobson, Edward D. *Understanding Fibonacci Numbers.* Greenville, SC: Traders Press, 1984.

A brief overview of Fibonacci numbers. Contains an extensive bibliography.

Edwards, Robert D. and Magee, John. *Technical Analysis of Stock Trends*. Sixth Edition. Boston, MA: John Magee, Inc., 1992. (Distributed by New York Institute of Finance.)

Explains trendlines and chart patterns.

Eng, William F. *The Technical Analysis of Stocks, Options, & Futures*. Chicago, IL: Probus Publishing,1988.

Fosback, Norman G. *Stock Market Logic*. Chicago, IL: Dearborn Financial Publishing, 1998. ISBN: 0793101484

Granville, Joseph E. *New Strategy of Daily Stock Market Timing for Maximum Profit.* Englewood Cliffs, NJ: Prentice-Hall, 1976.

A book from the inventor of On Balance Volume. Mr. Granville has earned a bearish reputation, but his technical tools remain valid.

Kaufman, Perry J. *Commodity Trading Systems and Methods.* New York: Wiley, 1978.

A serious book for the serious technician. While not required, a strong background in mathematics is helpful when reading this book.

Lebeau, Charles, and David Lucas. *Technical Trader's Guide to Computer Analysis of the Futures Market*. Homewood, IL: Business One Irwin, 1991.

An excellent book that shows the historical performance of popular technical indicators and oscillators.

Leibovit, Mark A. *Using the Volume Reversal Survey in Market Analysis.*

This pamphlet provides information on some of the pattern finding functions in the MetaStock formula language (i.e., Inside, Outside, Rally, and Reaction). Call 520-282-1275 for more information.

Merrill, Arthur A. *Filtered Waves-Basic Theory*. Chappaqua, NY: The Analysis Press, 1977.

This is an entire book about the Zig Zag indicator. It is available from: Technical Trends, John R. McGinley, Jr., P.O. Box 792 Wilton, CT 06897

Murphy, John J. *Technical Analysis of the Futures Markets.* New York, NY: New York Institute of Finance, 1986.

One of the best single sources of information on technical analysis. You don't have to trade commodities for this book to be valuable.

Natenberg, Sheldon. *Option Volatility and Pricing Strategies.* Chicago, IL: Probus Publishing Company, 1988.

Explains the Black/Scholes option calculations used in MetaStock.

Nison, Steven. *Japanese Candlestick Charting Techniques.* New York, NY: New York Institute of Finance, 1991.

Explains how to use and interpret Candlestick charts.

Nison, Steven. *Beyond Candlesticks.* New York, NY: Wiley, 1994.

Explains how to use and interpret Kagi, Renko, and Three Line Break charts.

Raff, Gilbert. *Trading the Regression Channel.* Salt Lake City, UT. Equis International, 1996.

Explains how to trade the Regression Channel and objectively draw trendlines.

Pring, Martin J. *Technical Analysis Explained.* Third edition. New York, NY: McGraw-Hill, 1991.

A complete, well-written book on technical analysis. Recommended.

Wilder, J. Welles. *New Concepts in Technical Trading Systems.* Greensboro, NC: Trend Research, 1978.

Explains the interpretation and calculation of about a dozen indicators including all of the Directional Movement indicators, the Relative Strength Index, and the Commodity Selection Index.

Williams, Bill. *Trading Chaos: Applying Expert Techniques to Maximize Your Profits (A Marketplace Book),* New York, NY: Wiley, 1995.

A practical introduction and guide for making sense of chaos theory and applying it to today's financial markets. A 2nd edition was published in February, 2004.

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